Responses to Comments

Public Review of Brayton Point Station
NPDES Permit No. MA0003654

U.S. Environmental Protection Agency
Region 1 (New England)
One Congress Street, Suite 1100
Boston, MA 02114-2023

October 3, 2003

Responses to Comments
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NPDES Permit No. MA0003654

Contents

Disclaimer

This document contains summaries rather than verbatim comments received by the U.S. Environmental Protection Agency (EPA) on the Draft Permit issued by the Agency and the Massachusetts Department of Environmental Protection for the Brayton Point Station power plant in Somerset, Massachusetts. The Draft Permit was made available for public comment on July 22, 2002. Some of EPA's responses reflect on changes made to the Final Permit issued in tandem with this document. It is important to note that the responses in this document might differ slightly from the language in the Final Permit. The permit language, however, has precedence and is legally binding on Brayton Point Station.

Preface

The U.S. Environmental Protection Agency's New England Region (Region 1) and the Massachusetts Department of Environmental Protection (MA DEP) are issuing a Final National Pollutant Discharge Elimination System Permit for the Brayton Point Station power plant in Somerset, Massachusetts, effective 60 days from the issuance date. This document presents EPA's response to the comments received on the Draft Permit (No. MA0003654) issued for Brayton Point Station on July 22, 2002. The individual responses explain and support EPA's determinations that form the basis of the Final Permit.

The comments and EPA's corresponding responses are organized under eight major subject areas or sections, as shown in the Contents. Preceding each individual comment/response grouping is a list of the document numbers to which it correlates, as shown in the following example:

Response # VIII.1	**Document #:** 1218

The document numbers relate to individual commenters. Two tables are provided at the beginning of the document to help readers find comments and responses. One table provides an alphabetical listing of commenters and their affiliations, along with document numbers. The second table provides a list of commenters organized by document number.

Many responses include figures, footnotes and references. Footnotes and references are provided on the text pages and figures are provided at the back of the document.

Finally, many responses refer the reader to Appendices. These Appendices are provided as a separate, companion document. The Response to Comments document is available on EPA's Web site at www.epa.gov/region1. The related Appendices are available upon request to EPA; please contact Damien Houlihan at 617-918-1586.

Acronyms, Abbreviations, and Symbols (Selective List)

AEI	Adverse Environmental Impact
AIM	Associated Industries of Massachusetts
ANOVA	Analysis of Variance [statistical model used to analyze data]
AR	Administrative Record
BACT	Best Available Control Technology
BAT	Best Available Technology
BCT	Best Conventional Pollutant Control Technology (also called Best Conventional Technology)
BIP	balanced, indigenous population of fish, shellfish and wildlife in the receiving water
BPJ	best professional judgment
BPS	Brayton Point Station
BPT	Best Practicable Treatment Technology
BT	benefits transfer
BTA	Best Technology Available
CAA	Clean Air Act
CALPUFF	Non-steady state meteorological and air quality modeling system by Earth Tech, Inc.
CAO	Critical Aquatic Organism
CBI	Confidential Business Information
CFR	Code of Federal Regulations
Cir.	Circuit [Court]
CLF	Conservation Law Foundation of New England
CMR	Code of Massachusetts Regulations
CP&L	Carolina Power & Light Company
CPUE	Catch Per Unit Effort [estimate of fishing effort or method to estimate resource abundance]
CSO	combined sewer overflow
CWA	Clean Water Act
CWIS	cooling water intake structure
CY	calendar year
dB(A)	A-weighted decibels
Dist.	District [Court]
DMR	Discharge Monitoring Report
DOE	Department of Energy
DOI	Department of the Interior

DPD	N,N-diethyl-p-phenylenediamine [agent used in analyzing water and wastewater samples for chlorine based on standard colorimetric techniques; Standard Method 4500-C1G and USEPA Method 330.5]
EAB	Environmental Appeals Board
ECP	Energy Clearing Price
EDF	Environmental Defense Fund
EFH	essential fish habitat
ELG	effluent limitations guideline
EMM	“Enhanced Multi-Mode”cooling system proposed by the permittee
EPA	Environmental Protection Agency
Fed. Reg.	*Federal Register*
FERC	Federal Energy Regulatory Commission
fps	feet per second
FOIA	Freedom of Information Act
GCO	EPA General Counsel’s Opinions
gpm	gallons per minute
HEA	Habitat Equivalency Analysis
HRC	Habitat Replacement Costs
HVAC	heating, ventilation, air-conditioning
I&E	impingement and entrainment
Id.	idem; “the same”
Inst.	Institute
IPM	Integrated Planning Model [a multi-regional, dynamic, deterministic linear programming model of the U.S. electric power sector developed by ICF Resources Incorporated]
ISO	independent system operator
ISO-NE	Independent System Operator of New England [bulk electricity generation & transmission]
LD	Legionnaire’s Disease
Leg. Hist.	Legislative History
LMS	Lawler, Matusky & Skelly Engineers, LLP, consultant to the permittee
LNG	liquid natural gas
MA DMF	Massachusetts Division of Marine Fisheries
MA DEP	Massachusetts Department of Environmental Protection
MA CZM	Massachusetts Office of Coastal Zone Management
MBtu	million British thermal units
MDI	methylene diphenyl isocyanate

MFG, Inc.	[subsidiary of Tetra Tech; Tetra Tech-MFG], consultant to EPA
MGD	million gallons per day
mg/l	milligrams per liter
ML	method detection limit
mm	millimeter
MOA	Memorandum of Agreement
MRI	Marine Research, Inc., consultant to permittee
MSS	Manchester Street Station, Rhode Island power plant also owned by the permittee
MW	megawatt
MW-hr	megawatt-hour
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NBE	Narragansett Bay Estuary
NEERS	New England Estuarine Research Society
NEPCO	New England Power Company, former owner of BPS
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
O&M	operation and maintenance
OGC	EPA's Office of the General Counsel
P&P	protection and propagation
PAH	polycyclic aromatic hydrocarbon
PG&E-NEG	Pacific Gas & Electric National Energy Group, subsidiary of PG&E Corp.; owner of USGen NE, the permittee and owner/operator of BPS
POTW	publicly owned treatment works
PSD	Prevention of Significant Deterioration
PUD	Public Utility District
RA	Regional Administrator of EPA
RAMAS	Risk Assessment, Management,and Audit Systems, software by Applied Biomathematics
RI DEM	Rhode Island Department of Environmental Management
RI DFW	Rhode Island Division of Fish and Wildlife (part of RI DEM)
RIS	Representative Important Species
S&W	Stone and Webster
SA	A MA and RI State Water Quality Classification Code

SAIC	Science Applications International Corporation, consultant to EPA
SB	A MA and RI State Water Quality Classification Code
SIDTEC	[A mechanical system for cleaning condensers at thermal power plants that reduces the use of chlorine and other biocides. Developed by Superior I.D. Tube Cleaners Inc.]
TAC	Technical Advisory Committee
TBtu	trillion British thermal units
TMDL	Total Maximum Daily Load
TRC	TRC Environmental Corporation, consultant to the permittee
TRO	total residual oxidant
TSS	total suspended solids
U.S.C.	United States Code
USGen NE	USGen New England, a subsidiary of PG&E-NEG, the permittee and owner/operator of BPS
USGen	shorthand for USGen NE
UWAG	Utility Water Action Group, trade association of electric generating companies
v.	versus
VSD	variable-speed drive (for water pumps)
WET	Whole Effluent Toxicity (a type of toxicity test)
WQS	water quality standard
WWTF	wastewater treatment facility
yr	year
§, §§	section, sections
°C	degrees Celsius (as in 25 °C; note spacing)
°F	degrees Fahrenheit

Commenters and Their Affilliations

Commenter	Affiliation	Doc #	Response Nos.
Ackerman, Frank - Ph.D.	N/A	1130	IV.66-85, VII.15-38
Affonso, George	PG&E	1183	VII.1
Aguiar, Jobelle	N/A	1101	VII.1, VII.93
Aker, Joanne C.	N/A	1111	VII.1, VII.85, VII.93
Aker, Joanne C.	N/A	1126	VII.1
Allen, George	N/A	1038	II.10, II.11, III.68, IV.51
Anderson Family, The	N/A	1108	VII.1
Anderson, William R.	N/A	1026	VII.74
Arruda, Andy	N/A	1239	VII.125
Asaro, Matthew & Andrea	N/A	1120	VII.1
Ashcroft, Richard	N/A	1003	IV.91
Ashworth, Glenn	N/A	1058	VII.1
Avery, Josey	Prudence Conservancy	1143	VII.1
Avreccia, Kenneth	Local 51 Plumbers & Pipefitter Union	1131	IV.87, VII.97
Bain, Peter	N/A	1024	VII.1
Barrett, David	PG&E	1186	IV.61-65
Bartlett, Michael J.	U.S. Department of the Interior	1148	II.3, III.53, III.59, III.60, III.61, III.62, IV.45, IV.52, IV.94, VII.98
Beck, Allan	N/A	1121	IV.86, VII.1, VII.96
Bell, Edward L.	N/A	1154	VII.101
Bennett, Tim	N/A	1086	II.10, III.68, VII.1
Bennett, Timothy	Green Futures	1197	VII.1, VII.110
Berard, L. Leandre	N/A	1128	VII.1
Berard, Leandre	Green Futures	1199	VII.1, VII.112
Berard, Lee	Green Futures	1235	VII.1
Berman, Stanley & Eileen	N/A	1048	VII.1
Bisagni, James J. - Ph.D	N/A	1091	IV.60, VII.1, VII.75
Blanchard, Christy Law	N/A	1070	III.68, IV.60, VII.1
Bordon, Ellen	PG&E	1205	II.13
Botelho, Tony	PG&E	1200	IV.61-65, VII.1
Botelho, Tony	PG&E	1215	VII.76, VII.117
Botelho, Tony	PG&E	1200	IV.61-65, VII.1
Botelho, Tony	PG&E	1215	VII.76, VII.117
Brady, Richard	N/A	1233	VII.1
Brooks, Priscilla; Chatwin Anthony; and Rawn, Carol Lee	CLF	1132	III.53, III.73-82, IV.45, IV.66-85, IV.95-110, V.9-11, VII.10-14, VII.15-38, VIII.63
Browder, Anna	N/A	1020	VII.1
Buchsbaum, Robert - Ph.D.	Mass Audubon Society	1136	II.3, III.58, VII.1
Burrows, Janice	N/A	1061	VII.1
Callahan, Joseph	N/A	1019	IV.54, VII.1
Carvalho, Joe	Coalition for Social Justice	1193	VII.109
Castongvay, Joseph	N/A	1192	II.19, VII.1, VII.108
Castro III, Vacso	Bristol, RI, Town of - Conservation Commission	1001	VII.1

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Castro III, Vasco	Hopeworth Community Association	1142	VII.1
Castro, Everett	N/A	1189	IV.61-65, VII.84
Castro, Everett J.	N/A	1093	VII.1
Chace, Rick	N/A	1088	VII.1, VII.75, VII.77
Chatwin, Anthony	CLF	1180	II.7, III.53, III.57, IV.54, VII.70
City Council	Fall River, City of	1007	VII.1, VII.75
Colosi, Petter D.	NOAA	1155	II.11, III.63, III.72, VII.102
Colt, Rosemary M.	N/A	1060	VII.1
Corbishley, John W.	N/A	1041	VII.1
Costello, Neal	Rubin & Rudman	1173	VII.76, VII.105
Costello, Neil	Competitive Power Coalition	1228	VII.76
Cranmer, David	N/A	1045	VII.1, VII.15-38
Crawley, Wesley C.	N/A	1009	VII.1
Daniels, Susan	N/A	1081	VII.75
Danzberger, Alex	N/A	1065	VII.1
Dator, John	N/A	1179	VII.1, VII.15-38
Davis, Robert W.	Taunton River Watershed Alliance	1135	VII.1
DeAlteris, Joseph	DeAlteris Associates	1191	II.4
Desrochers, Louise M.	N/A	1046	VII.1
Dione, David	N/A	1198	VII.75, VII.76, VII.111
Dionne, David P.	N/A	1027	VII.1
Dormody, Sheila	Clean Water Action	1217	VII.75, VII.118
Downing, John	Stone and Webster	1178	IV. 61-65
Downing, John	Stone and Webster	1216	IV.61-65
DuBois, Pine	Jones River Watershed Association	1190	VII.107
Durfee, Nancy	N/A	1063	VII.75
Edward, Jack	N/A	1097	VII.1
Edwards, Mary Ann	Portsmouth, RI, Town of	1213	VII.1, VII.75
Ehrlich, Lori	Healthlink	1138	VII.1, VII.75, VII.89
Embrey, Robert	N/A	1002	II.18, VII.80
Feeney, Kathy	N/A	1069	VII.1
Felag, Senator Walter	RI State Senator	1243	VII.75
Ferris, Monte	N/A	1181	II.12, VII.1
Folliard, James	N/A	1116	VII.1, VII.94
Franklin, Lisa	PG&E	1240	VII.126
Froner, Jane	N/A	1051	VII.1
Fuchs, Louis A. - M.D.	N/A	1068	VII.1
Fulford, Robert L.	N/A	1096	II.10, III.71, VII.92
Furtado, Stephen - Superintendent of Schools	N/A	1172	VII.15-38
Fyfe, Sandy	N/A	1117	VII.1
Gagnon, Eleanor - Chairman	Somerset, Town of - Board of Health	1170	IV.91
Gagnon, Eleanor L. - Chairman	Somerset - Board of Health	1006	III.69, VII.81
Gallison, Raymond E.	RI State Representative	1209	II.10, II.14, VII.75
Gallison, Rep. Raymond E.	N/A	1147	VII.1
Gamettie Family, The	N/A	1113	VII.1
Gessler, Robert	N/A	1083	VII.1
Gill, Anita	N/A	1072	VII.75, VII.88
Gill, Anita	N/A	1055	VII.1, VII.88

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Gillespie, Gay	Westport River Watershed Alliance	1137	III.68, VII.1, VII.75
Greenwood, Clifton	Clifton Health Care	1201	VII.75, VII.113
Grumond, C.	N/A	1017	VII.1
Haddad, Patricia	State Representative	1167	VII.1, vII.15-38
Hall, Jim	N/A	1013	VII.1
Hallberg, Richard N.	Warren Land Conservation Trust	1144	VII.1, VII.93
Hamel, Armand	PG&E	1236	III.49, III.50
Hamel, Armand	N/A	1008	III.49, III.50
Hamel, Bob	N/A	1062	III.68, IV.51, VII.75, VII.76
Handy, Seth	N/A	1037	III.46, III.68
Harrison, Jane	Warren, RI, Town of - Conservation Commission	1000	VI.29, VII.1, VII.79
Harrison, Jane	N/A	1214	II.8
Heroux, Jeffrey P.	N/A	1110	VII.1, VII.15-38
Hogan, Brian P. - D.M.D	N/A	1042	III.68, IV.60, VII.1, VII.75
Hogan, Lori	N/A	1090	VII.1
Hogon, Brian & Lori	N/A	1014	VII.1
Hood, Roger	N/A	1182	III.69, VII.81
Hood, Roger & Virginia	N/A	1011	II.69, VII.81, VII.82
Horn, Nelson	N/A	1012	IV.61-65
Hornsey, Rev. James H.	N/A	1036	III.68, IV.51, VII.1, VII.75, VII.91
Hovey, C.	N/A	1025	VII.1
Howard, Paul J.	New England Fisheries Management Council	1160	III.63, IV.55
Iribe, Chris	PG&E	1164	IV.66-85, VII.1
Jacobs, Wendy	Foley & Hoag	1218	III.1-44, IV.1-44, IV.61-65, V.1-8, VI.3-28, VII.2-9, VII.39-67, VII.78, VII.127, VII.128, VIII.162
Jan H. Reitsma	RI DEM	1152	IV.88, VII.100
Juhasz, Susan	N/A	1122	VII.1
Karce, Diane	N/A	1085	VII.75
Karcz, Diane	N/A	1242	VII.75
Keith, Joseph	N/A	1016	III.70, VII.83
Kelly, Nathan E.	N/A	1052	VII.1, VII.75
Kennedy, Rep. Patrick	N/A	1146	IV.54, IV.61-65
Kerr, Meg	Rhode Island Rivers Council	1153	VII.1
Ketschke, Barry	PG&E	1165	II.4, II.5, II.6, IV.66-85, VII.1
Ketschke, Barry	PG&E	1206	VII.1, VII.15-38
Kinsella, Mil	Sullivan	1028	III.52, VII.75
Kinsella, Mil	Sullivan	1078	VII.75
Kortright, Petern F.	Fall River Area Chamber of Commerce & Industries	1156	IV.66-85, VII.1
Kverek, Rosemary	N/A	1054	VII.87
Langhauser, Andrea D.	Mass Office of Environmental Affairs	1149	VII.1, VII.99
Leary, Don	N/A	1073	VII.1
Leary, Eileen	N/A	1033	III.45, VII.77
Lee, Camilla	N/A	1056	II.10, III.68, VII.71, VII.89

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Leeson, Robert	N/A	1035	II.10, VII.15-38, VII.75
Lepare, Shirley & Gary	N/A	1030	VII.1
Lepare, Shirley & Gary	N/A	1031	VII.1
Lima, Alfred	N/A	1034	IV.61-65, VII.1, VII.73, VII.84, VII.91
Lund, William	N/A	1194	VII.1
Lycurgus, Dina	N/A	1067	III.47, VII.75
Lynch, Patrick	N/A	1226	VII.1
MacPherson, Douglas	RI Saltwater Anglers Association	1230	IV.90, VII.122
Malone, Patrick	N/A	1071	III.68, IV.51, VII.75
Martin, David	N/A	1015	VII.1
Mass, Bob	N/A	1227	II.10, IV.66-85
Massie Family, The	N/A	1053	II.10, III.68, IV.60, VII.86
McAuliff, John	Somerset, Town of - Board of Selectmen	1169	VII.75
McCormick, Lillian	N/A	1022	II.10, III.51, VII.1
McGreavy, Connie L.	N/A	1075	III.68, VII.15-38
McLaughlin, Walter H. - Attorney at Gilman McLaughlin & Hanrahan	Town of Somerset - Board of Selectmen	1004	IV.61-65, IV.66-85, IV.91, VII.15-38, VII.75
Medeiros, Stephen	RI Saltwater Anglers Association	1225	II.10, III.68, VI.2
Meehan, Bill	Somerset Board of Selectmen	1168	IV.61-65, IV.66-85, IV.91, VII.1, VII.15-38, VII.75
Melucci, Frank & Louise	N/A	1029	VII.77
Menard, Joan	MA State Senetor	1166	VII.1
Miller, Julie	N/A	1074	III.68
Mis, Marianne	N/A	1112	VII.1, VII.93
Moreira, Suzanne	N/A	1129	VII.1, VII.91
Morra, Joe & Susan	N/A	1087	VII.1
Morrill, Ann	Kickemuit RIver Council	1145	VI.29, VII.77
Morrill, Ann	Kickemuit River Council	1224	VII.120
Morrill, Ken	N/A	1232	VII.1
Morris, Morris D.	N/A	1064	VII.15-38
Morris, Morris D.	N/A	1064	VII.15-38
Morris, Robert	RI Inshore Trawler Fishing Association	1204	II.10, VII.77
Morris, Robert	RI Trawler Association	1220	II.10, II.15, II.16, VI.2, VII.72, VII.75, VII.77,, VII.119
Murgo, Anthony D.	N/A	1118	VII.75, VII.95
O'Hearn, Jim	N/A	1124	VII.1, VII.85, VII.93
Oliver, E.	N/A	1044	VII.1
O'Shea, John V.	Atlantic States Marine Fisheries Commission	1241	VII.1
Page, Donna	N/A	1107	VII.1
Palen, Don G.	N/A	1082	VII.1
Paquette, Darryl J., Esq.	Coalition for Buzzards Bay, The	1134	VII.1
Parella, Joseph F.	Town of Bristol, RI	1005	IV.54
Park, Richard, *et al*	N/A	1099	II.10, III.52
Parker, Kathy L.	N/A	1105	VII.1, VII.85, VII.93
Parker, Kathy L.	N/A	1127	VII.1
Pearson, Stephanie	N/A	1114	VII.1
Phillips, Aimee & Carlin J.	N/A	1076	VII.1

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Polk, Catherine	Sakonnet River Association	1188	VII.1
Powers, Thomas	PG&E	1238	VII.1
Powers, Tom	PG&E	1203	IV.61-65, IV.66-85
Ramit, Peter	PG&E	1195	IV.66-85, VII.1, VII.76
Ramitt Jr., Peter	PG&E	1234	VII.1
Rapoza, Michael	N/A	1018	VII.1
Rawn, Carol Lee	CLF	1175	III.73-82, IV.61-65, IV.95-110, V.9-11, VII.10-14, VIII.63
Reitsma, Jan	RI DEM	1161	III.56, III.58, IV.49, IV.50, IV.56, IV.57, IV.58, VII.104
Reitsma, Jan H.	RI DEM	1211	II.10, II.11, III.67, III.68, IV.51, IV.60, VII.1, VII.115
Rhoury, Henry	N/A	1010	II.9
Richard P. Leavitt	N/A	1094	VII.1, VII.91
Richard, N.	N/A	1043	VII.85
Riley, William K.	N/A	1077	III.68
Rio, Robert	Associated Industries of Massachusetts	1187	IV.61-65, VII.15-38
Roberts, Evelyn	N/A	1100	VII.1
Robinson, Patricia	N/A	1047	VII.1
Rothschild, Brian	UMass Dartmouth	1176	III.66
Rucci, Micheal	N/A	1222	II.10, VII.75
Ruggiero, Richard	Bristol, RI - Town Council	1212	VII.1, VII.75, VII.93, VII.116
Ruth Perlow	N/A	1098	VII.1
Savage, Deidre	New England Council, The	1174	VII.15-38, VII.76, VII.105
Sax, Jennifer	Gradient Corp	1221	IV.89
Saxe, Jennifer	Grady Corporation	1196	IV.89
Shea, Susan H.	N/A	1057	VII.1
Silva, Donna	N/A	1100	VII.1
Silverman, Stephen	Somerset - Economic Development Commission	1171	VII.15-38
Simas, Meredith	PG&E	1202	IV.59
Simas, Meredith	PG&E	1207	VII.1
Sittig, Tricia	N/A	1125	VII.1
Skinner, Tom	Mass CZM	1159	III.64, III.65, IV.46, VI.1, VII.69
Smith, James	N/A	1237	IV.61-65, VI.1, VII.75, VII.76, VII.124
Spalding, H. Curtis	Save the Bay	1133	II.1, II.2, III.53, III.54, III.55, III.56, III.57, III.73-82, III.83, IV.47, IV.48, IV.53, IV.66-85, IV.95-110, IV.111, V.9-11, VII.10-14, VII.15-38, VII.68, VIII.63
Stavins, Robert	Analysis Group	1223	IV.61-65, IV.66-85, VII.15-38
Stavins, Robert	N/A	1184	IV.66-85, VII.15-38
Stephen Zbyszewski	N/A	1095	III.47, III.48
Storey, David and Barbara	N/A	1066	III.47, III.68

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Stottmeir, Kurt D.	N/A	1023	VII.1
Sullivan, Kevin	N/A	1084	VII.75
Sullivan, Kristin	N/A	1080	VII.75
Sullivan, Patricia	N/A	1079	VII.75, VII.90
Taylor, Terry	N/A	1050	VII.1
Tollefson, Carolynne	Canoll	1229	IV.61-65, VII.1, VII.75, VII.76, VII.121
Torgan, John	Save the Bay	1177	IV.66-85, IV.92, VII.1, VII.106
Torgan, John	Save the Bay	1231	VII.1, VII.123
Trainor, Michael C.	N/A	1092	VII.1, VII.75
Travis, Philip	Mass State Representative	1210	II.17, IV.61-65, IV.93, VII.76
Urba, Janis	Larel Park Improvement Association	1139	VI.29
Vashon, Norma W.	N/A	1049	VII.1
Walsh, Anna	N/A	1103	VII.1
Walsh, C. R.	N/A	1106	VII.1
Walsh, Charles	N/A	1109	VII.1
Walsh, Charles R.	N/A	1115	VII.1
Walsh, Cody	N/A	1104	VII.1
Walsh, Judith	N/A	1102	VII.1, VII.93
Watts, Douglas	N/A	1119	VII.1, VII.91
Welch, Gail	N/A	1089	VII.1
Whitehouse, Sheldon	Rhode Island Attorney General	1150	II.1, III.73-82, IV.61-65, IV.66-85, IV.95-110V.9-11, VII.1, VII.10-14, VII.15-38, VIII.63
Whitehouse, Sheldon	Rhode Island Attorney General	1208	IV.66-85, VII.1, VII.15-38, VII.114
Whitehouse, Sheldon	Rhode Island Attorney General	1151	IV.61-65, VII.1
Whittemore, Ron	N/A	1032	VII.1, VII.75
Wilkins, Dianne	N/A	1021	VII.1, VII.75
Williams Family, The	N/A	1059	VII.1
Wislocki, Louis C.	N/A	1123	VII.1
Woods, Charlie	N/A	1039	III.68, IV.51
Worrell, Richard D.	N/A	1040	VII.1
Zoto, George A.	N/A	1158	VII.103
	Eastern Rhode Island Conservation District	1140	VI.29, VII.1, VII.77
	Eastern Rhode Island Conservation District	1141	VI.29, VII.1, VII.77
	Kickemuit Middle School	1157	VII.1

Commenters by Document Number

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I. Summary

The U.S. Environmental Protection Agency's New England Region (EPA) and the Massachusetts Department of Environmental Protection (MA DEP) are issuing a Final National Pollutant Discharge Elimination System (NPDES) Permit for the Brayton Point Station (BPS) power plant in Somerset, Massachusetts. This permit is being issued under the Federal Clean Water Act (CWA), 33 U.S.C., §§ 1251 *et. seq.*, and the Massachusetts Clean Water Act, M.G.L. Ch. 21, §§ 26–35. The facility is owned and operated by USGen New England, Inc., a subsidiary of PG&E National Energy Group, which is, in turn, a subsidiary of PG&E Corporation (referred to hereinafter as either the "permittee" or "PG&E-NEG").

Located on the shores of Mount Hope Bay, BPS commenced operations in the 1960s, before enactment of the CWA. Relying mostly on coal for fuel, BPS is the largest fossil fuel-burning electric power plant in New England. BPS discharges pollutants to and withdraws water from Mount Hope Bay. The bay is an interstate waterbody transected by the Massachusetts/Rhode Island state line and makes up part of the larger Narragansett Bay estuary. The facility's discharges of pollutants and cooling water withdrawals are subject to various requirements under Federal law and the laws of both States.

In accordance with the provisions of 40 CFR 124.17, this document presents EPA's responses to comments received on the Draft NPDES Permit (No. MA0003654) issued for BPS. The responses to comments explain and support the EPA determinations that form the basis of the Final Permit. This summary briefly describes the scientific and legal bases of the Final Permit limits and the permit process, as well as a number of minor changes that have been incorporated into the Final Permit in response to comments.

EPA and the MA DEP issued BPS's last NPDES permit on June 16, 1993, and it became effective 30 days later. The permit's 5-year term expired in July 1998, but it remains in effect pending issuance of a new Final Permit. On July 22, 2002, EPA and the MA DEP jointly issued the new Draft NPDES Permit for BPS under Federal and State law. At that time, the agencies opened a 1½-month public comment period on the Draft Permit, scheduled to end on September 4, 2002. EPA regulations require that comment periods extend a minimum of 30 days. In response to a request from the permittee, the comment period was subsequently extended to 2½ months (i.e., until October 4, 2002). In addition to inviting written comments, EPA and the MA DEP held two public informational meetings, one in Somerset, Massachusetts (August 5, 2002), and one in Bristol, Rhode Island (August 6, 2002). At these meetings, the agencies made presentations, answered questions, and listened to views presented by the public, including the permittee. The agencies then held two formal public hearings to receive comments on the Draft Permit. Again, one was in Somerset (on August 26, 2002) and the other was in Bristol (on August 27, 2002).

EPA received a total of 167 sets of written comments on the Draft Permit, comprising hundreds of pages of material. EPA and the MA DEP also received oral comments from numerous individuals at the two public hearings. Some individuals provided both written and oral comments, and some commenters, including numerous representatives of the permittee, spoke at both public hearings. In addition to the permittee's comments, EPA also received comments from a number of elected officials from both Massachusetts and Rhode Island, numerous governmental entities (at the Federal, State, and local levels), private organizations (e.g., environmental organizations, fishing organizations, and business organizations), and many individual citizens. The comments presented a wide range of viewpoints. Many supported the Draft Permit as is, whereas others commented either that the permit was too stringent or that it was not stringent enough.

EPA and the MA DEP greatly appreciate the time, effort, information, and expertise that the commenters, including the permittee, have contributed to improve the development of this Final Permit. EPA has given careful consideration to the comments and information it has received. Thus, the permit has been thoroughly investigated from many perspectives. EPA's commitment to considering all the information and viewpoints presented resulted in a lengthy decision-making process for the Final Permit because of the complexity of the issues at hand and the volume of comments received. Indeed, considering and responding to certain comments required detailed analysis, as presented in EPA's responses to comments.

In addition, EPA sought review of the permit by various Federal and State government agencies in accordance with applicable law. Pursuant to CWA § 401(a)(1), the MA DEP has certified that the Final Permit's limits satisfy Massachusetts' water quality standards. Pursuant to the Coastal Zone Management (CZM) Act, the Massachusetts CZM Office has confirmed that the Final Permit limits are consistent with the Commonwealth's CZM Program. EPA has also determined that the Final Permit's limits satisfy applicable Rhode Island water quality standards. The Rhode Island Department of Environmental Management (RI DEM) has indicated that limits at least as stringent as those in the Final Permit are necessary to satisfy the State's water quality standards, and that it does not object to the permit's limits. Finally, the National Marine Fisheries Service has agreed that the permit satisfies the Essential Fish Habitat requirements of the Magnuson-Stevens Fishery Conservation and Management Act, as well as requirements of the Endangered Species Act.

In the end, EPA and the MA DEP believe that the extensive time and effort invested in this process have produced a Final Permit consistent with Federal and State law and supported by sound science and public policy. EPA believes that compliance with this permit will play an important role in protecting and restoring the ecosystem of Mount Hope Bay, an important public resource.

A. Ecological Considerations

EPA and the MA DEP have concluded that BPS's large thermal discharge to, and cooling water withdrawal from, the Mount Hope Bay estuary have caused or contributed to significant adverse environmental impacts, including the collapse of the bay's fish stocks. Specifically, EPA believes that BPS's discharge of waste heat—approximately 42 trillion British thermal units (TBtu) discharged annually—has adversely affected the important estuarine habitat in the bay. For example, BPS's thermal discharge alters the normal temperature profile of the bay so that water temperatures exceed preferred temperatures for various resident fish species. In addition, BPS's cooling water withdrawals of approximately 1 billion gallons per day from the bay result in the entrainment and impingement of trillions of marine organisms each year, including the eggs, larvae, juveniles, and adults of various fish species, such as winter flounder. EPA and the MA DEP have reached these conclusions based on careful consideration of data, scientific studies, and extensive comments on the Draft Permit, including contrary views presented by the permittee.

EPA has determined that the thermal discharge limits in the Final Permit, representing a 96 percent reduction over the current condition, are both necessary and sufficient to "assure the protection and propagation of a balanced, indigenous population of fish, shellfish and wildlife" in Mount Hope Bay, as required by § 316(a) of the CWA. In addition, EPA has determined that the less stringent thermal discharge limits requested by the permittee will not meet this standard. The MA DEP has concurred with EPA's § 316(a) determination.

EPA has also determined that the cooling water intake capacity limits in the Final Permit—representing a 94 percent reduction in water withdrawals from the bay—are both necessary and sufficient to ensure that the capacity of BPS's cooling water intake reflects "the Best Technology Available for minimizing adverse environmental impacts," as required by § 316(b) of the CWA. This reduction in cooling water withdrawal volume will achieve a like percentage (i.e., 94 percent) reduction in entrainment and impingement of marine life. EPA has also determined that the less stringent cooling water intake limits requested by the permittee will not satisfy this standard. The MA DEP has concluded that the limits in the Final Permit adequately address the entrainment and impingement impacts from BPS's cooling water intake structures and will allow for the attainment of the designated uses of Mount Hope Bay, as set forth in state water quality standards.

As with the Draft Permit, the Final Permit imposes performance standards limiting thermal discharges (measured in British thermal units and maximum temperature) and cooling water intake capacity (measured in millions of gallons per day [MGD]). The permittee may choose the method by which it will comply with these limits. EPA has concluded, however, that converting the power plant's open-cycle cooling system to a closed-cycle system using some type of wet mechanical draft cooling towers is likely the most cost-effective way for the facility to meet the proposed permit limits. This type of system would not, however, provide for completely "closed-cycle" cooling. The facility would still require water withdrawals of approximately 56 MGD for so-called "make-up water" for the cooling system, and, after losses to evaporation, a 38-MGD maximum daily discharge of thermal effluent would remain.

EPA and the MA DEP developed this permit to satisfy the requirements of the applicable Federal and State water pollution control laws. Viewed in a larger context, however, the agencies see the reduction in BPS's impact on Mount Hope Bay that will result from this permit as an important part of broader public and private efforts to restore and maintain the health of the ecosystem, including the fishery, of Mount Hope Bay and the greater Narragansett Bay estuary. Other efforts in this regard include steps to improve sewage treatment and abate CSOs from the City of Fall River and steps to improve fishery management (including implementation of fishing restrictions) in both the Massachusetts and Rhode Island portions of Mount Hope Bay. Since BPS is the largest industrial discharger affecting the habitat and fishery of Mount Hope Bay, appropriate controls on the power plant's discharges and water withdrawals will be a critical contribution to this larger effort. Moreover, by upgrading the power plant to include modern cooling technology, the new permit limits can be met while allowing the plant to continue as a major source of electricity for New England without significant effects on consumer electric rates.

B. Final Permit Limits

The Final Permit for BPS includes limits on the discharge of a number of chemicals, metals, and other pollutants, including thermal effluent, as well as limits on the capacity of the plant's cooling water intake structures (CWISs). Although EPA paid careful attention to each aspect of the permit, the limits on thermal discharge and cooling water intake capacity have been the subject of extreme public interest and have required particularly rigorous analysis because of the nature of the issues presented and the applicable legal framework.

The thermal discharge limits for BPS are based on a site-specific variance under § 316(a) of the CWA. The limits on cooling water intake capacity are based on the site-specific, best professional judgment (BPJ) application of the requirements of CWA § 316(b) and State water quality standards. Thus, these limits are based on separate, independent legal requirements, each of which must be satisfied.

Thermal Discharge Limits. NPDES permits generally must include either technology-based or water quality-based limits, with the more stringent limits governing. Section 316(a) of the CWA, however, authorizes EPA to allow less stringent thermal discharge limits based on a variance from technology-based and/or water quality-based requirements (a "CWA § 316(a) variance"). Specifically, CWA § 316(a) authorizes EPA to permit alternative, less stringent thermal discharge limits when it is demonstrated to EPA that the alternative limits "will assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on [the receiving water] ..." (referred to hereinafter as the "balanced indigenous population" or "BIP"). While economic and technological considerations are reflected in technology-based standards, the statutory test for a CWA § 316(a) variance is based solely on the stated biological considerations. The thermal discharge limits in the Draft Permit for BPS were, in fact, based on such a CWA § 316(a) variance.

After careful consideration of public comments and updated analyses conducted in response to those comments, EPA has concluded that the thermal discharge limits included in the Draft Permit are necessary to satisfy the requirements of CWA § 316(a) and should remain unchanged in the Final Permit. Therefore, this Final Permit establishes performance standards including an annual thermal discharge limit of 1.7 trillion Btu (Tbtu), a maximum discharge temperature of 95 °F, and a delta-T limit of 22 °F. (A delta-T limit restricts the extent to which a facility may increase the temperature of the water it withdraws from a source waterbody when it is discharged to the receiving water. In other words, subtracting the influent temperature from the effluent temperature yields the delta-T.) These limits are less stringent than what would have been required by technology-based or water quality-based requirements. These limits are, however, substantially more stringent than the CWA § 316(a) variance-based thermal discharge limits requested by the permittee. EPA determined that the less stringent limitations requested by the permittee would not satisfy the statute. A detailed explanation of EPA's CWA § 316(a) determination for the Draft Permit is set forth in Chapter 6 of EPA's *Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from Brayton Point Station in Somerset, MA* (July 22, 2002) ("EPA's July 22, 2002, Permit Determinations Document"). The responses to comments below address the comments EPA received on the issue of thermal discharges.

The Massachusetts DEP has certified the permit's CWA § 316(a) variance-based thermal discharge limits under CWA § 401(a)(1). The RI DEM has indicated that it does not object to the variance-based limits under CWA § 401(a)(2). Finally, these thermal discharge limits have also been found to be consistent with the requirements of the Coastal Zone Management Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the Endangered Species Act.

While the thermal discharge limits in the permit are based on a CWA § 316(a) variance, EPA also determined what limits would have applied based on applicable technology standards (Best Available Technology [BAT]) and Massachusetts' and Rhode Island's water quality standards. The water quality-based limits were based largely on a mixing zone analysis by the MA DEP. The technology standards and water quality standards analyses were presented in Chapters 4 and 5, respectively, of EPA's July 22, 2002, Permit Determinations Document. EPA received many comments related to the analyses of technology-based and water quality-based limits, and it has provided responses to these comments. Because the permit's thermal discharge limits are based on a CWA § 316(a) variance, however, these issues are, in a sense, moot.

Cooling Water Intake Capacity Limits. CWA § 316(b) requires that the "location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." EPA explained the bases of its CWA § 316(b) determination for the Draft Permit in Chapter 7 of EPA's July 22, 2002, Permit Determinations Document. After careful consideration of public comments and updated analyses conducted in response to those comments, EPA has concluded that the limits on cooling water intake capacity included in the Draft Permit are necessary and sufficient to satisfy the requirements of CWA § 316(b) and should remain substantially unchanged in the Final Permit. As a result, the Final Permit establishes a performance standard providing for an intake capacity limitation of 56 MGD, with an additional 6.847 billion gallons **per year** allowable for temporary open-cycle cooling operations. In response to comments from the State of Rhode Island and others, however, EPA has added the restriction that cooling water intake capacity reflecting once-through cooling operations is prohibited during the winter flounder spawning season (February through May) to avoid serious adverse environmental impacts from entrainment and impingement during that time. EPA's responses to comments related to the CWA § 316(b)-based permit limits are presented below.

The intake capacity limits in the Final Permit reflect the performance achievable if BPS's cooling system is retrofitted from an open-cycle system to a closed-cycle system using some type of wet mechanical draft cooling towers for all four electrical generating units at the power plant. EPA has determined that such a cooling system upgrade constitutes the Best Technology Available (BTA) for minimizing adverse environmental effects in accordance with CWA § 316(b). As noted above, the plant will still require 56 MGD for cooling tower make-up water. Although this is still a substantial intake flow, it represents a 94 percent reduction from current operations and will achieve a like reduction in entrainment and impingement. The permit will also allow the additional 6.847 billion gallons **per year** of intake flow from once-through cooling operations noted above, but such once-through cooling is prohibited during the winter flounder spawning season (February through May). This additional flow is based on the additional amount of intake flow that would make the total flow limit correspond to flow levels associated with the thermal discharge allowed under CWA § 316(a). EPA has determined that this additional modicum of intake flow, in light of the restrictions on its use and the major reduction being required, will not prevent the intake limits from satisfying the BTA standard of CWA § 316(b).

As stated above, the permit's intake limits represent performance standards that the permittee can meet in any manner it chooses, but these limits reflect EPA's determination that the above-discussed cooling system retrofit with wet mechanical draft cooling towers constitutes the BTA for BPS. EPA has investigated a number of different ways that such a cooling tower retrofit could be accomplished at BPS and has determined that such a retrofit is technologically and economically feasible at BPS. Moreover, EPA has determined that the cost of such a retrofit, even assuming the higher cost estimates submitted by the permittee, would not be wholly disproportionate to the substantial public benefits estimated to result from making these improvements. In addition, EPA has determined that the use of cooling towers at BPS presents no significant adverse environmental effects (such as noise, water vapor plumes, traffic safety, aesthetics) that cannot be adequately managed with established, affordable technology. That being said, whether, and to what extent, any such effects might require mitigation and the optimal approach for achieving any such mitigation will not be finally determined until the State regulatory process is carried out to address noise, air emissions, and the like.

Finally, EPA has considered the regional energy implications of retrofitting the BPS cooling system with cooling towers and concluded that no significant adverse effects will result. The use of cooling towers will only slightly reduce the amount of electricity generated for sale by BPS over the long term. The region's energy supply is more than adequate and can easily accommodate this change at BPS. The new NPDES permit limits will also have no effect on the plant's ability to use coal as its major fuel. In addition, the changes at BPS were conservatively estimated (i.e., estimates were geared to overstate rather than understate the effects) to have at most only a small, insignificant effect on consumer electric rates over the long term. The long-term rate effect on the typical 500-kWh-per-month consumer household from increased production costs and slightly reduced generation as a result of the cooling system improvements is conservatively estimated to range from approximately $0.06 per month to $0.18 per month. EPA also found that using cooling towers will actually allow BPS to generate **more** electricity at times during the peak-demand, hot-weather periods when the plant currently has to curtail generation to stay within the permit's maximum temperature limit. This benefit could prove helpful to the region's electric supply during these hot weather periods, when the region's electric supply is most severely tested. Turning to short-term effects, EPA notes that the cooling system conversion will result in short-term, temporary generating unit outages at BPS. These outages can, however, be sequenced and managed to avoid any significant effects on the region's power supply just as the occasional outages that currently occur within the system are managed. EPA also predicts that there will be a somewhat larger short-term consumer rate effect as a result of these unit outages, but that these effects will occur only during a small number of months and will also be insignificant. Specifically, EPA conservatively estimates that generating unit construction outages could result in a short-term rate effect of $6.27 spread over 36 weeks (i.e., approximately $0.70 per month for only 9 months) for the typical 500-kWh-per-month consumer household.

Although the intake capacity limits in the Final Permit are based on the BTA technology standard from CWA § 316(b), EPA also has to include any more stringent limits needed to ensure compliance with State water quality standards. EPA has reviewed the application of both Massachusetts and Rhode Island water quality standards, consistent with CWA §§ 301(b)(1)(C) and 401(a)(1) and (2), and concluded that although the permit limits are adequate to satisfy the States' standards, these limits could not be made significantly less stringent without violating those standards. Thus, although the permit limits are based on CWA § 316(b), they are bolstered by the requirements of State water quality standards. Again, the MA DEP has issued a certification pursuant to CWA § 401(a)(1) indicating that the Final Permit's intake requirements will allow attainment of the designated uses of Mount Hope Bay set forth in Massachusetts' water quality standards. The RI DEM (representing "the downstream affected State") has confirmed that limits at least as stringent as those in the Final Permit are needed to satisfy the State's water quality standards and that it does not object to the limits in the permit. Finally, these intake capacity limits have also been found to be consistent with the requirements of the Coastal Zone Management Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the Endangered Species Act.

Other Permit Limits. The permit also includes limits on the discharge of pollutants other than heat. Such limits include restrictions on the amount of chlorine and various chemicals and metals (e.g., copper, zinc) that can be discharged by the power plant. The basis of these permit limits is presented in the "Fact Sheet" issued with the Draft Permit. Comments on these permit limits are responded to below.

Monitoring Requirements. The permit contains a variety of types of monitoring requirements to enable the regulatory agencies to track compliance with various limits in the permit. Comments on the permit's monitoring requirements are responded to below.

Compliance Schedule. It is obvious that BPS will need a certain amount of time to install the cooling system upgrades to enable it to comply with the new permit limits. The CWA, however, prohibits a compliance schedule from being included in the permit under the present circumstances. Therefore, the permit is written to require immediate compliance, but EPA expects to impose a reasonable compliance schedule in an Administrative Compliance Order issued pursuant to CWA § 309(a). It is important that compliance be attained expeditiously because of the environmental damage the plant's cooling system is causing and will continue to cause until the permit's limits are complied with. EPA and the MA DEP expect to discuss this compliance schedule further with the permittee. The Agency notes that the permittee has estimated a 47-month schedule to install the needed equipment, whereas EPA has estimated a 39-month schedule.

C. Changes Made in Final Permit

The Final Permit is substantially identical to the Draft Permit that was available for public comment. Although EPA's decision-making process has benefited from the various comments and additional information submitted by commenters, the information and arguments presented did not raise any substantial new questions concerning the permit. Many of the concerns raised by commenters had already been addressed in EPA's original Fact Sheet and Permit Determinations Document. EPA did, however, improve certain analyses in response to comments. These improvements are detailed in this document and continue to support EPA's determinations.

The changes made in the Final Permit are listed below. The analyses underlying these changes are explained in the responses to individual comments that follow.

1. EPA has eliminated the permit requirement that BPS inspect the discharge canal every other day from April to November for dead or dying fish. EPA removed this requirement because it believes the substantial reduction in thermal discharge allowed by the permit should significantly decrease the potential for fish kills in the discharge canal. In addition, the fact that divers are inspecting the nets in the discharge canal three or four times a week and can observe fish kills at that time satisfies the need to monitor fish mortality in the canal.

2. The inconsistency in the Draft Permit (pp. 19–20) regarding whether the discharge temperature needs to be reduced to 90 °F or 95 °F in response to a fish kill was corrected. In the Final Permit, the permittee is required to reduce the discharge temperature to 90 °F in this situation.

3. EPA has removed the permit's damages provision for discharge-related fish kills. This permit condition is not federally enforceable and simply repeats certain provisions found in the Massachusetts General Laws, which apply regardless of whether they are included in the permit.

4. EPA has changed the value for the heat capacity of water used in the calculation of the heat load from 0.94 Btu/(lb × °F) to a fixed value of 1.0 Btu/(lb × °F). EPA has also changed the value of the specific gravity of water used in the calculation of heat load from 8.55 lb/gallon (seawater) to 8.344 lb/gallon (pure water).

5. EPA has changed the method of calculating the heat load from the plant. In response to comments on the values for heat capacity and specific gravity used in the calculation of heat load, and also in response to the comment regarding separate blowdown streams, EPA reviewed the calculation method for heat load in the Draft Permit. EPA identified that the Draft Permit used the blowdown stream flow rate (outfall 003), but required that the delta-T be calculated using the discharge temperature from outfall 001 (delta-T = discharge temperature − intake temperature). EPA has realized, however, that this approach was problematic because the temperature at outfall 001 could be influenced by other waste streams, such as internal outfall 004. This could lead to slight underreporting of the heat load to the bay. EPA has corrected this and now requires that the temperature of the blowdown streams (outfalls 003A, 003B, and 003C) be monitored and used to calculate the heat load. The individual heat loads from the three cooling tower blowdown streams will be summed to determine the total heat load from the facility. When the facility switches to once-through cooling, the heat load for once-through cooling will be calculated using the discharge temperature and flow at outfall 001. Once-through cooling heat load will be summed with the heat loads from the blowdown streams to derive the total heat load.

6. EPA has changed permitted outfall 003 (cooling tower blowdown for all units) to break it down into three permitted internal outfalls (003A–units 1 and 2; 003B–unit 3; and 003C–unit 4). Limits have been applied at these internal outfalls, including added temperature monitoring and reporting requirements.

7. EPA has added a requirement for four ambient water temperature monitoring stations in Mount Hope Bay using continuous temperature monitoring equipment.

8. EPA has added requirements for monitoring and reporting intake flow.

9. To mitigate environmental impacts, EPA has limited the period during which the 122 hours of once-through cooling may be used. The Final Permit does not allow the use of once-through cooling during the winter flounder spawning season (February through May). EPA has included a

requirement that the permittee include the reason for any bypass with its notification of such bypass.

10. EPA has allowed the screen-wash frequency for the unit 4 intake to be reduced from continuous to three times daily after installation of the closed-cycle cooling system for the entire station.

11. EPA has allowed the use of outfall 005 for "nonthermal" backwash but has required that any such use be counted as part of the facility's annual 122 hours of once-through cooling allotment.

12. EPA has required the facility to report the number of hours (and flow rate) when the screen backwash system for units 1, 2, and 3 is tested.

13. EPA has modified the pH limit to account for possible variations in the pH of the inlet water source. The permit specifies that the pH must be neither less than 6.5 standard units nor greater than 8.5 standard units, or if outside that range the pH must be no more than 0.2 standard unit from the naturally occurring range. This is consistent with Massachusetts' water quality standards.

14. EPA has removed the pH monitoring requirement from internal outfalls. Compliance with pH will be determined at outfall 001.

15. EPA has clarified the reporting of average monthly values for total suspended solids (TSS) and oil and grease to be consistent with Discharge Monitoring Report (DMR) requirements.

16. EPA has clarified that the method of total residual oxidant (TRO) and free available chlorine analysis should be the amperometric method as found in 40 CFR Part 136, Table 1B. EPA has changed the type of sampling for compliance purposes from "continuous" to "grab." As a "report-only" requirement, however, EPA is also requiring that the facility report the results of continuous monitoring of TROs and free available chlorine.

17. EPA has changed the ML for TRO from 0.05 mg/l to 0.02 mg/l.

18. EPA has clarified that the permittee shall use a value of "zero" for daily samples that are below the ML in averaging the monthly TRO value.

19. EPA has modified the permit's iron and copper limits. For iron, the daily maximum limit is 1.0 mg/l and the average monthly limit is 1.0 mg/l. The iron limits, which are technology-based, apply after treatment at outfall 004. For copper, the daily maximum limit is 0.0289 mg/l and the monthly average limit is 0.0185 mg/l. The copper limits, which are water quality-based, apply at the end of the pipe. The limits for both iron and copper were set on a concentration (or effluent) basis rather than a mass basis after EPA determined that concentration-based limits for these two metals were more appropriate.

20. EPA has changed footnote 1 in parts A.6 and A.7 of the permit to footnote 3. In addition, the language has been changed to specify only the minimum detection level (ML) for iron.

21. EPA has corrected a typographical error in the Draft Permit to make clear that the permit contains **monthly** average limits (rather than **daily** average limits) for priority pollutants, chromium, and zinc for outfalls 003A, 003B, and 003C (cooling tower blowdown streams).

22. EPA has changed the sampling schedule of the wastewater treatment system to require collection of daily samples when metal cleaning wastes are being discharged and weekly samples during "normal" operations when no metal cleaning wastes are being discharged.

23. EPA has eliminated the reporting of the influent metal cleaning waste stream volume. This requirement originally appeared in footnote 2 in Sections A.6 and A.7 of the permit.

24. EPA has changed the permitted maximum daily and average monthly flow limits for internal outfall 004 (wastewater treatment system) to 4.0 MGD and 2.0 MGD, respectively.

25. For clarification, EPA has separated outfall 004 into two separate designations, outfall 004A and outfall 004B. Outfall 004A will be used until the anticipated new air pollution control equipment begins producing wastewater discharges. It will then be replaced by outfall 004B after air pollution control waste streams begin discharging to the wastewater treatment facility. EPA will require that the permittee inform EPA by letter of the expected date of discharge from air pollution control equipment.

26. EPA has added a monitoring and reporting requirement for vanadium at outfall 004A (prior to the initiation of wastewater discharge from air pollution control equipment).

27. EPA has included GE Benz's AP412 Methyl Orange Method as the analytical method for determining compliance with the Spectrus CT1300 permit limit of 0.2 ppm. has added requirements for monitoring and reporting intake flow.

28. EPA has included a provision to allow BPS to seek an alternative sampling scheme for whole effluent toxicity (WET) testing in certain situations. A written request and EPA approval, with concurrence from MA DEP, are required.

29. EPA has corrected a number of typographical errors in the Draft Permit and slightly modified some permit language to make it clearer. These revisions do not change any substantive requirements from the Draft Permit.

D. Organization of Responses and Availability of Administrative Record

Organizing these responses to comments in a "user-friendly" manner has been a difficult challenge for a number of reasons. First, the Agency received a very large number of comments, some of which were voluminous. Second, these comments addressed a wide variety of complex issues related to the permit. Third, while some comments clearly addressed specific permit conditions, others addressed issues related to the permit without specifying which specific permit conditions they pertained to. In still other cases comments addressed general issues that may have relevance to more than one specific permit condition. An example of the latter type of comment would be one concerning the general health (or lack thereof) of the Mount Hope Bay fishery, which could potentially be relevant to permit conditions under both CWA § 316(a) and § 316(b).

In light of the above issues, EPA has taken the following approach to organizing the responses to comments: (a) responses are generally categorized according to the provision of the CWA or permit limit that the comment relates to (e.g., § 316(a) or § 316(b)); (b) comments regarding permit limits or issues other than thermal discharges or cooling water withdrawals have been combined and categorized as "Other Permit Limits"; and (c) comments that are general in nature and do not clearly relate to a particular permit limit have been grouped together under the topics "Ecological Setting" or "Miscellaneous Comments," as appropriate. Specifically, this responses to comments document is organized in the following order: (1) "Summary"; (2) "Ecological Setting"; (3) "CWA § 316(a) Variance-Based Thermal Discharge Limits"; (4) "CWA § 316(b)-Based Cooling Water Intake Limits"; (5) "State Water Quality Standards-Related Issues"; (6) "Other Permit Limits"; (7) "Miscellaneous Comments;" and (8) "Best

Available Technology Standard-Based Thermal Discharge Limits" (supplanted by CWA § 316(a) variance-based limits). Finally, it should also be noted that, consistent with legal requirements, EPA has combined and consolidated many similar individual comments to try to help reasonably streamline the responses to comments. EPA worked with several expert consultants on the development of this response to comments. These consultants produced a number of technical reports for this project. EPA has independently considered each of these reports and has adopted and incorporated them by reference into this document as Appendices A-X.

All documents cited in these responses to comments are included in the Administrative Record for the Final Permit decision. All public comments on the Draft Permit, including transcripts from the public hearings, are also included in the Administrative Record. Furthermore, certain new materials submitted to EPA regarding the permit after close of the public comment period, or gathered or developed by EPA in responding to comments, are also included in the Administrative Record. The Administrative Record is available for review at the offices of EPA-New England at One Congress Street in Boston, Massachusetts. EPA has also posted copies of the Final Permit and the response to comment document on the EPA Region 1 Web site (www.epa.gov/region1/).

II. Ecological Setting

Response # II.1	**Document #**: 1133, 1150

Comment
EPA received two comments stating that Mount Hope Bay was historically an important breeding ground for commercially harvested fish and was one of the more productive estuaries in the Northeast.

Response
EPA agrees that Mount Hope Bay, as an estuary, serves as an important spawning and nursery area for a variety of commercial fish and shellfish. Data collected in the 1970s through the mid-1980s by a consultant for Brayton Point Station (BPS) document a dramatically greater abundance of fish than what occurs in the bay today. George Mathieson, a consultant for BPS, testified at a permit modification hearing in June 1976 "that Mount Hope Bay continues to rank among the most productive estuaries in the Northeast."

Response # II.2	**Document #**: 1133

Comment
EPA received one comment stating that Mount Hope Bay was a historically important commercial and recreational fishing location.

Response
Historically, commercial and recreational fishing for a variety of fish species did occur in Mount Hope Bay. Owing to the current status of fish populations in Mount Hope Bay, commercial fishing has been essentially eliminated and recreational fishing for many demersal species has been severely curtailed. Some recreational fishing for striped bass and bluefish, however, does continue within the bay.

Response # II.3	**Document #**: 1136, 1148

Comment
EPA received two comments stating that the CWA § 316(a) analysis did not include potential impacts on marine birds such as terns, waterfowl, and shorebirds. Many estuaries are important foraging areas for these species, so a decline in habitat quality or fish stocks might result in abundance changes to marine birds. Mount Hope Bay was formerly noted as a habitat for canvasbacks (*Aythya valisineria*), but it apparently is no longer. It would be worth investigating whether trends in bird use of Mount Hope Bay reflect wider regional trends or are specific to the bay.

Response
EPA approached both commenters to ask for data that may shed light on this question and was referred to Robert Raftovich of the U.S. Fish and Wildlife Service, who had data from the midwinter waterfowl survey. The intent of this data collection effort is to look at long-term trends in waterfowl abundance generally on a statewide scale. It is not intended to be used to look at year-to-year changes or for small spatial scales. With these limitations in mind, EPA looked at long-term trends of waterfowl abundance in the Mount Hope Bay/Taunton River area. No clear trend through time was apparent for any species, including canvasbacks (Figure 3) or even for total bird abundance. Thus, the limited data that EPA could find does not suggest a link between operations in Brayton Point Station and bird abundance in Mount Hope Bay. EPA believes that the permit limits will be protective of the aquatic community and by extension the avian community that may depend on those aquatic resources.

Response # II.4	**Document #**: 1165, 1191

Comment
EPA received two comments stating that the decline of certain species of fish in Mount Hope Bay was nearly identical to the decline of species in Narragansett Bay, in terms of both timing and degree and that any decline in fish abundance was limited to the upper third of Mount Hope Bay.

Response
EPA maintains that the decline in Mount Hope Bay is statistically greater than the changes seen in Narragansett Bay. A peer-reviewed analysis done by Mark Gibson in 1996 supports that conclusion, as does the work by Collie and Delong (2002) and the analysis by Joe DeAlteris, a consultant to PG&E-NEG. The issue of the areal extent of this decline has been the subject of some debate. PG&E-NEG has suggested that the MRI trawl data cover 5 square miles or one-third of Mount Hope Bay. EPA does not agree that the MRI trawl survey actually represents only 5 square miles. EPA discusses this in detail in responses to comments pertaining to § 316(b) elsewhere in this document. Mount Hope Bay is characterized by extensive shallow-water habitat, which is predominantly what the MRI trawl survey samples. Therefore, one could reasonably say that this survey represents at least the 9 square miles of shallow-water habitat in the bay. PG&E-NEG also represents the impacts as occurring only in Massachusetts waters. MRI has a station located in Rhode Island waters at least 1 mile south of the state line; therefore, the impacts reflected in the survey extend into Rhode Island waters.

Response # II.5	**Document #**: 1165

Comment
EPA received one comment stating that the timing of the decline of certain species of fish and the timing of the change in the cooling system do not coincide. The decline in fish precedes any changes in the cooling system.

Response
EPA disagrees with this comment. EPA believes that there is a significant association in time between the fish decline and cooling system flow. Monitoring has shown that as BPS's flow and thermal discharge increased, fish populations declined. Commenters have made the point that peak plant flow and thermal load occurred after fish populations had begun to decline; however, this does not indicate that the increase in thermal discharge was unrelated to the decline in fish. Rather, this suggests that the winter flounder population reached a threshold that triggered the collapse, and thus additional increases in flow and heat above and beyond this point would not show further harm to the already collapsed population.

Response # II.6	**Document #**: 1165

Comment
EPA received one comment stating that there is no recovery of fish stocks that have declined in either Mount Hope Bay or Narragansett Bay.

Response
EPA agrees that no recovery of fish stocks has occurred in Mount Hope Bay, but abundance of key flatfish species continues to be significantly greater in Narragansett Bay.

Response # II.7	**Document #**: 1180

Comment
EPA received one comment stating that there is no compelling evidence that overfishing is the cause of low winter flounder abundance in Mount Hope Bay.

Response
EPA has always maintained that overfishing is certainly part of the problem in Mount Hope Bay. It is one of several stressors to the fish populations in Mount Hope Bay. It is important to note that EPA's permit will address the contribution from one of these stressors, the power plant, while fishery regulators are also implementing additional restrictions on groundfishing. EPA is hopeful that this combined effort will lead to a rejuvenated Mount Hope Bay.

Response # II.8	**Document #**: 1214

Comment
EPA received one comment stating that the biological community in the Kickamuit River has changed in the recent past. Blue crabs, spider crabs, horseshoe crabs, tautog, and shellfish have declined, while lion's mane jellyfish and sea squirts have increased.

Response
EPA cannot specifically comment on these observations, except to state that the Agency is hopeful that its permit will allow for the recovery of the balanced indigenous population in Mount Hope Bay. EPA is aware that some species of sea squirts that are invasive or nonnative species have been rapidly expanding over the North Atlantic. Without knowing the specific species that the commenter was referring to, it is impossible to comment further. With respect to tautog, the fishery data discussed in this permit development are consistent with the commenter's observations.

Response # II.9	**Document #**: 1010

Comment
EPA received one comment stating that the commenter has been fishing and eating the fish in the Taunton River and Mount Hope Bay for 70 years. The commenter is in good health and does not fault the power plant for the decline of fish in Mount Hope Bay.

Response
Currently, there are no data to suggest that eating fish from Mount Hope Bay represents a human health risk. EPA's major concerns with the power plant have to do with how the operations of the facility affect habitat and impinge and entrain large numbers of eggs, larvae, juveniles, and adult organisms. See EPA's July 22, 2002, Permit Determinations Document (pp. 6-54 to 6-58) for the specific reasons for linking the decline of finfish populations to operations at BPS.

Response # II.10	**Document #**: 1022, 1035, 1038, 1053, 1056, 1086, 1096, 1099, 1204, 1209, 1220, 1222, 1225, 1227, 1211

Comment
EPA received 15 comments stating that populations of fish, including winter flounder and tautog, in Mount Hope Bay have declined or collapsed.

Response
These observations are consistent with the data generated by PG&E-NEG's monitoring program. Fish abundance as measured in the MRI trawl survey underwent a dramatic decline of over 87 percent during

1984–1985. Winter flounder, tautog, windowpane, and hogchoker experienced statistically greater declines in Mount Hope Bay than they did in neighboring Narragansett Bay. Fish abundance data through 2002 have shown no sign of recovery in Mount Hope Bay, where many species continue to exist at extremely low abundance levels.

Response # II.11	**Document #**: 1038, 1155, 1211

Comment
EPA received three comments stating that aggressive fishery management efforts have been put in place to restore winter flounder to Rhode Island bay waters. The commenters stated that BPS continues to retard the recovery of winter flounder.

Response
EPA agrees that such fishery management measures have been implemented, and that the effects of operations at BPS are a remaining source of mortality to be addressed. In its July 22, 2002, Permit Determinations Document, EPA noted the evolution of fishery restrictions in Massachusetts and Rhode Island waters for winter flounder. Mount Hope Bay has essentially become a "no-take" zone for winter flounder, and the quantity of fish taken in Narragansett Bay has also been severely restricted. Certainly, more efforts need to be made to reduce overfishing, and indeed, additional restrictions are imminent as Amendment 13 to the Northeast Multispecies Fishery Management Plan will be instituted in spring 2004. This will reduce fishing effort by 65% to winter flounder in federal waters. For Mount Hope Bay, EPA believes that the cumulative impact from BPS operations, including the entrainment of larvae and eggs, the impingement of juveniles and adults, and the direct and indirect impacts of the thermal plume, has played a significant role in preventing a recovery of winter flounder in the bay. The permit EPA issues today is designed to minimize these impacts to allow a recovery of the balanced, indigenous population of Mount Hope Bay, including the winter flounder.

Response # II.12	**Document #:** 1181

Comment
EPA received one comment stating that there has been no decline in fish in Mount Hope Bay based on the commenter's observation of recreational fishermen carrying "buckets of fish."

Response
To assess trends in populations, it is necessary to have a systematic, quantitative approach to collecting the data. PG&E-NEG's trawl survey, conducted by MRI, is the best data set for examining changes in fish abundance in Mount Hope Bay. Occasional observations of fishermen carrying fish provide no quantification of the numbers or types of fish. Furthermore, the time and effort required to catch that quantity of fish are unknown. Based on the systematic approach in PG&E-NEG's monitoring program, EPA concludes that fish populations in Mount Hope Bay have collapsed to extremely low levels compared with pre-1984 population numbers.

Response # II.13	Document #: 1205

Comment
EPA received one comment stating that overfishing has caused the decline of fish populations in Mount Hope Bay.

Response
EPA acknowledges that overfishing is an important factor in the population dynamics of a number of the commercial species in Mount Hope Bay; however, the dramatic collapse in fish populations in Mount

Hope Bay in the mid-1980s does not appear to be related to fishing pressure. In Mount Hope Bay, declines that were statistically significantly greater than those observed in Narragansett Bay occurred for both commercial and noncommercial fish species. For a full explanation of EPA's view on why the collapse of fish populations in Mount Hope Bay is not due solely to overfishing, see pp. 6-47 through 6-50 of EPA's July 22, 2002, Permit Determinations Document.

Response # II.14	**Document #**: 1209

Comment
EPA received one comment stating that bluefish no longer enter Mount Hope Bay.

Response
Trawl data from both the State of Rhode Island and PG&E-NEG show the continued presence of bluefish in Mount Hope Bay.

Response # II.15	**Document #**: 1220

Comment
EPA received one comment stating that 30,000 to 50,000 winter flounder were harvested weekly in Mount Hope Bay in the 1950s.

Response
Historical data do show that Mount Hope Bay was once a very productive area for finfish.

Response # II.16	**Document #**: 1220

Comment
EPA received one comment stating that Mount Hope Bay used to be far more productive than Narragansett Bay.

Response
The data do not exist to make this comparison; however, both waterbodies were significantly more productive in the past than they are today.

Response # II.17	**Document #**:1210

Comment
EPA received one comment stating that winter flounder populations have declined everywhere.

Response
EPA disagrees with this characterization of the status of winter flounder populations. Winter flounder populations in the Gulf of Maine and Georges Bank are doing well, with stock spawning biomass well above what the New England Fisheries Management Council considers to be the maximum sustainable level. The southern New England stock spawning biomass is currently at a level below the maximum sustainable level, but recently has experienced a small upward trend. Although there are certainly other locations where winter flounder populations have declined, the status of the regional winter flounder populations does not match the changes in abundance in Mount Hope Bay. (See Figures 4, 5, and 6.)

Response # II.18	**Document #**: 1002

Comment
One commenter indicated that "the ecological system has improved a lot," referring to the fact that he has seen more cormorants and harbor seals recently. The commenter stated that he does not believe that the station kills as many fish as are taken by fishermen and asks for more fishing restrictions.

Response
Trends in cormorant populations are discussed in the Determination Document and EPA acknowledges that their populations have increased substantially since the 1980's. However, the observation of more cormorants and harbor seals does not necessarily equate with a healthy ecosystem or with balanced, thriving fish stocks. Boston Harbor, even at its worst point, had an abundance of both cormorants and harbor seals. Severe fishing restrictions are currently in place for Mount Hope Bay and Narragansett Bay. However, additional management restrictions are needed outside these waters. Shortly, fishermen will be required to make significant additional sacrifices as Amendment 13 of the Northeast Multispecies Fishery Management Plan is enacted by next spring. Amendment 13 is intended to significantly reduce fishing mortality on a number of groundfish species, including winter flounder.

Response # II.19	**Document #**:1192

Comment
One commenter believes from personal observation that the Bay is thriving and also thinks the extent of the environmental controls in the Draft Permit is the result of the threat of a lawsuit. He also comments that there are many fish, cormorants, and fisherman in the area.

Response
EPA has designed this permit to meet the requirements of the CWA with respect to thermal discharges and intake flows. The permit was not shaped by any threat of a law suit. We discuss these legal requirements as well as the state of the biological community of Mount Bay in detail elsewhere in this document.

III. CWA § 316(a) Variance-Based Thermal Discharge Limits

Response #:III.1-44	**Document #**: 1218

1. Comment
PG&E-NEG stated that CWA § 316(a) "entitles" a thermal discharger to "alternative" thermal discharge limits if such alternative limits will be adequate to satisfy the biological standard of CWA § 316(a).

Response
EPA **has** based the NPDES permit's thermal discharge limitations on a CWA § 316(a) variance. These limitations are less stringent than would otherwise be required by technology-based and/or water quality-based requirements. Although EPA rejected the "alternative" limits proposed by the permittee because they did not satisfy the biological standard of CWA § 316(a), the Agency then imposed a different set of "alternative" limits that the Agency determined **would** meet that test.

Although the commenter seems to argue that a discharger necessarily has an impregnable right to CWA § 316(a) variance-based thermal discharge limits once the biological standard of that provision has been satisfied, the validity of this argument is not at issue here because EPA **did** grant the permittee a § 316(a) variance. The Agency simply issued different variance-based limits than those requested by the permittee based on the Agency's application of the law to the facts of this case. Because the issue is not joined here, EPA will not resolve the question of whether thermal dischargers have an unassailable "entitlement" to § 316(a) variance-based limits once they meet the biological standard in that provision.

Nevertheless, EPA wishes to note that the validity of such an argument is questionable for a number of reasons, including that the plain language of the statute, the legislative history, and EPA regulations all indicate that CWA § 316(a) **authorizes**, but does not command, EPA (or a State administering the NPDES permit program) to put "alternative" thermal discharge limits in a permit—i.e., alternative to the technology-based and/or water quality-based limits that would otherwise apply under the law—if the biological standard of § 316(a) is satisfied. For example, the statutory and regulatory language states only that EPA "may" set such alternative thermal discharge limits, not that it "shall" or "must" do so. 33 U.S.C. § 1326(a); 40 CFR §§ 125.70, 125.73(a). See also *In the Matter of Public Service Company of New Hampshire (Seabrook Station, Units 1 & 2)*, 10 ERC 1257, n. 7 (U.S. EPA, NPDES Permit Application No. NH 0020338, Case No. 76-7, June 17, 1977); 40 CFR §§ 123.25(a)(4), (35) and (36). (States seeking delegation of the NPDES program are not precluded from omitting or modifying to make more stringent the provisions of 40 CFR §§ 122.21(m) and 124.62 and Part 125, Subpart H, all of which govern § 316(a) variances.)

Of course, despite the permissive nature of the variance requirement stated in § 316(a), EPA's permitting decisions are subject to the requirements of the Administrative Procedures Act and cannot be arbitrary and capricious. EPA would need to have a legitimate reason not to grant variance-based thermal discharge limitations in such circumstances, if it found that such limitations would otherwise meet § 316(a) biological standards. A possible example of such a situation might be if EPA concluded that a particular set of thermal discharge limitations would be sufficient to assure the protection and propagation of the balanced, indigenous population of fish, shellfish, and wildlife in and on the receiving water, but the discharge's thermal load was causing or contributing to violations of State water quality standards for dissolved oxygen, eutrophication, and/or aesthetics and interfering with attainment of designated uses such as primary contact recreation. In such a case, a State might refuse to certify the permit under CWA § 401(a)(1) or impose more stringent permit conditions in its certification that should be included in the permit in accordance with CWA § 401(d). (The issue of the interaction of CWA § 316(a) and § 401 is discussed elsewhere in this document.)

2. Comment
PG&E-NEG acknowledged that it has the "burden of proof" in seeking to justify a proposed variance under CWA § 316(a). The permittee commented, however, that EPA incorrectly characterizes this burden of proof as "extremely rigorous." The permittee stated that EPA must review PG&E-NEG submissions to determine whether the permittee has "provided reasonable assurance" that its proposed 316(a) variance-based thermal discharge limits will not cause "appreciable harm" to the BIP of Mount Hope Bay. The permittee stated that instead of taking this approach, EPA has based the Draft Permit on a misreading of the relevant law and an erroneous biological analysis. PG&E-NEG said that EPA has created a "novel and unreasonable standard of law" for this case that is different from that applied in all other cases, and that EPA's analysis is inadequate to justify denial of the permittee's variance request.

Response
EPA believes it has properly characterized and explained the "burden of proof" that an applicant for a CWA § 316(a) variance must bear. The Agency has not created for this case a "novel" or "unreasonable" standard different from that applied in other cases. EPA's view of the burden of proof is discussed in some detail in § 6.2.3 of EPA's July 22, 2002, Permit Determinations Document. See also *Id.* at § 6.2.2.

When EPA characterized the burden faced by the applicant for a § 316(a) variance as "extremely rigorous," the Agency was simply trying to characterize the burden as defined by the statute, the regulations, and earlier EPA decisions. The Agency did not mean to suggest that it was adding any additional increment to the burden faced by the applicant and did not do so. EPA meant only to explain that the burden of proof for justifying a § 316(a) variance was "stringent."

EPA continues to believe that its characterization of the burden of proof was accurate. This is based on several points discussed in § 6.2.3 of EPA's July 22, 2002, Permit Determinations Document. First, CWA §316(a) itself states that the permitting agency may allow alternative variance-based thermal discharge limits only when the applicant has demonstrated to the

> . . . satisfaction of the Administrator that . . . [the effluent limits that would otherwise apply] *will* require effluent limitations more stringent than necessary to assure the pro[t]ection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made, . . . [and that the alternative limits] *will assure* the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on that body of water.

33 U.S.C. § 1326(a) (emphasis added). EPA believes this statutory language creates a stringent standard. See also CWA of 1972 Legislative History, p. 175; 40 CFR §§ 125.70 and 125.73(a). Second, the Administrator of EPA has expressly stated that "the burden of proof in a 316(a) case is a stringent one." *In the Matter of Public Service Company of New Hampshire (Seabrook Station, Units 1 & 2)*, 10 ERC 1257, 1264 (U.S. EPA, NPDES Permit Application No. NH 0020338, Case No. 76-7, June 17, 1977).

Third, in § 6.2.3 of EPA's July 22, 2002, Permit Determinations Document, EPA was also clear that the amount and type of evidence needed to sustain a § 316(a) variance application may vary with the circumstances of the case and that this may result in the need for detailed, rigorous analysis even where an existing facility is seeking reissuance of a prior variance decision. The materials cited in the permittee's comments support the Agency's view. See, e.g., *Public Service Company of New Hampshire*, 10 ERC at 1264 ("[n]o hard and fast rule can be made as to the amount of data that must be furnished . . . [and that m]uch depends on the circumstances of the particular discharge and receiving waters"); *Review of Water Quality Standards, Permit Limitations, and Variances for Thermal Discharges at Power Plants* (EPA) (October 1992), p. 15 (the degree of evidence needed to renew a § 316(a) variance depends on the environmental circumstances of the case and detailed study may be needed); *Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements* (DRAFT) (EPA) (May 1, 1977), §§ 3.1, 3.2, and 3.3 (different degrees of review and data are needed depending on the nature of the environmental issues presented by the case; factors discussed in the document would suggest detailed review for the BPS thermal discharge). EPA believes it has more than demonstrated that the facts of this case warrant the level of review that has been provided for this permit. See *Public Service Company of New Hampshire*, 10 ERC at 1264 ("The greater the risk, the greater degree of certainty that should be required" in making variance determinations under § 316(a).).

The permittee has noted that the burden on the applicant for a CWA § 316(a) variance has at times been characterized as a requirement to provide "reasonable assurance" that alternative thermal discharge limits will result in the protection and propagation of the balanced, indigenous population (BIP) of fish, shellfish, and wildlife in and on the receiving water. EPA does not disagree with this formulation. It merely recognizes that the language of § 316(a) requires "assurance" of the protection and propagation of the BIP—the statute says "will assure" rather than "might assure"—but that EPA cannot unreasonably refuse to find such assurance. EPA understands this.

Indeed, EPA also previously noted that the Agency should not hold out for "certainty" before granting a § 316(a) variance. See § 6.2.3 of EPA's July 22, 2002, Permit Determinations Document. EPA believes its evaluation has been reasonable in this regard. After careful evaluation, EPA concluded that the alternative thermal discharge limits proposed by the permittee did not provide reasonable assurance that protection and propagation of the BIP would be achieved. Rather than simply rejecting any § 316(a) variance, however, the Agency identified a more stringent set of alternative limits that it concluded **would** provide a reasonable degree of assurance of protection and propagation of the BIP and placed these limits in the permit. EPA concluded that these were the least stringent limits that would satisfy CWA § 316(a). These limits do not, however, **guarantee** the protection and propagation of the BIP. The permit limits still allow a significant discharge of heat to Mount Hope Bay that will adversely affect 10 percent of the bay's area, which includes sensitive spawning habitat. This discharge would also violate State water quality standards in the absence of a § 316(a) variance. Moreover, the seriousness of the cumulative effects of the plant's thermal discharge might vary depending on whether, and to what extent, the recent pattern of rising water temperature apparently associated with climate change continues. Thus, monitoring will be needed to determine whether the permit's thermal discharge limits remain sound for future permit reissuance proceedings.

The permittee states that in discussing the burden of proof, EPA cited comments regarding CWA § 316(a) by "Senator Muskey [sic]" from the legislative history for the Clean Water Act Amendments of 1977, despite the fact that § 316(a) was enacted as part of the CWA of 1972. See § 6.2.3 of EPA's July 22, 2002, Permit Determinations Document. EPA is well aware that Senator Muskie's comments in the 1977 legislative history were made **after** the 1972 enactment of § 316(a). Consequently, EPA also recognizes that they constitute less persuasive authority than if they had been made contemporaneously with enactment of the statutory provision in question. EPA did not, however, rely principally on these comments. Without these comments, the Agency's assessment of the burden of proof would be the same. EPA had already provided clear authority for its view from the statutory language, the legislative history of the 1972 Act, EPA regulations, and the Administrator's decision in *Public Service Company of New Hampshire*, 10 ERC at 1264. Nevertheless, as EPA noted in § 6.2.3 of EPA's July 22, 2002, Permit

Determinations Document, n. 5, Senator Muskie's comments about § 316(a) are of interest because, as the Supreme Court has noted, he was the "principal Senate sponsor of the Act." *Environmental Protection Agency* v. *National Crushed Stone Association*, 449 U.S. 64, 71 n. 10 (1980). His comments are consistent with the stringent burden of proof that EPA has described.

Finally, the permittee's citation to *Davila-Bardales* v. *INS*, 27 F.3d 1, 5 (1st Cir. 1994), is entirely inapposite. In that case involving an immigration issue, the government had altered its standard practice without explanation or recognition. Here, EPA did not alter its past practices or legal interpretation with respect to burden of proof. Moreover, EPA fully explained its approach to the issue and the basis for it.

3. Comment

PG&E-NEG argued that when assessing whether a thermal discharge will assure the protection and propagation of the "balanced, indigenous population of fish, shellfish and wildlife in and on the receiving water," as required by CWA § 316(a), the "baseline for analysis is the population that would exist today in the absence of the power plant." Furthermore, the permittee stated that EPA has distorted this standard and biased it by requiring an evaluation using as the reference point a hypothetical community of fish that would exist in the absence of numerous stressors unrelated to the power plant. PG&E-NEG stated that the appropriate reference point is the current population of fish in Narragansett Bay since EPA has agreed that Narragansett Bay's fishery has not been affected by BPS.

Response

EPA believes that it has properly applied the phrase "balanced, indigenous population of shellfish, fish and wildlife in and on [the receiving water]" (the "BIP") from CWA § 316(a) in the development of the NPDES permit for BPS. This issue is discussed in § 6.2.2 of EPA's July 22, 2002, Permit Determinations Document.

In its comments, the permittee argues that the BIP is whatever population would "exist today in the absence of the power plant." EPA thinks this approach would go too far in allowing thermal discharges to contravene the protection and propagation of the BIP as required by § 316(a). According to the permittee's approach, if a fish population had been decimated by, for example, pollution from other sources (or by overfishing or even an existing power plant's cooling water intake structure), the depleted population that remained would constitute the BIP to be protected. As a result, the power plant could be allowed to discharge as much heat as would not interfere with maintaining this decimated population regardless of whether much less thermal discharge would be required to assure the protection and propagation of an otherwise healthy BIP.

EPA believes that the permittee's approach would be inconsistent with CWA § 316(a). The statutory language refers to assuring the protection and propagation of a "balanced, indigenous" population. This does not mean it is just **any** population with some degree of balance; it is supposed to be balanced and **indigenous** to the receiving water. See *In the Matter of Public Service Company of Indiana, Inc.* (*Wabash River Generation Station*, *Cayuga Generating Station*, 1 E.A.D. 590, 1979 EPA App. LEXIS 4, 28 (NPDES Appeal No. 78-6) (Nov. 29, 1979) ["316(a) cannot be read to mean that a balanced indigenous population is maintained where the species composition, for example, shifts from a riverine to a lake community or, as in this case, from thermally sensitive to thermally tolerant species."]). Although the specific term "indigenous" is not defined in the statute or regulations, the *American Heritage Dictionary (2d College Edition)* defines "indigenous" to mean "occurring or living naturally in a particular area or environment; native . . . [, i]ntrinsic, innate." This indicates that the BIP should generally consist of populations expected to exist in the waterbody naturally—with certain exceptions noted in EPA regulations and discussed below—rather than just **whatever** population may exist there today. As EPA explained in *Wabash*, 1979 EPA App. LEXIS at 28, defining the BIP as whatever population exists after it has been altered by pollution would be "at war with the notion of 'restoring' and 'maintaining' the biological integrity of the Nation's waters," one of the core purposes of the Clean Water Act. 33 U.S.C. § 1251(a).

As EPA explained in § 6.2.2 of EPA's July 22, 2002, Permit Determinations Document, the legislative history of CWA § 316(a) confirms the Agency's view. The Conference Committee Report on S. 2770, which became the CWA of 1972, stated the following (in pertinent part):

> THERMAL DISCHARGES [Section 316]
>
> It is not the intent of this provision to permit modification of effluent limits required pursuant to Section 301 or Section 306 where existing or past pollution has eliminated or altered what would otherwise be an indigenous fish, shellfish and wildlife population.

1972 Legislative History, p. 175.[1]

As is also discussed in § 6.2.2 of EPA's July 22, 2002, Permit Determinations Document, EPA regulations defining "balanced indigenous population" confirm this view as well. They note that a BIP may include "historically non-native species" only under certain specified circumstances (i.e., species introduced as part of a wildlife management program or "species whose presence or abundance results from substantial, irreversible environmental modifications"). 40 CFR § 125.71(c). EPA's regulation also states that a BIP will not normally include species whose presence or abundance is attributable to either discharges of pollutants that would be eliminated by compliance of all sources with CWA technology standards or thermal discharge limits authorized under a § 316(a) variance. See also *Wabash*, 1979 EPA App. LEXIS at 29 ("though it may be difficult or even impossible to define what the precise balanced indigenous population would be in the absence of heat, it is generally sufficient, as the regulations provide, that it 'will not include species whose presence or abundance is attributable to the introduction of pollutants,' such as heat, and that it should be characterized by 'non-domination of pollution tolerant species'").

Furthermore, EPA's regulations direct that thermal discharge limits under a § 316(a) variance must assure the protection and propagation of a BIP in the receiving water "considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected." 40 CFR § 125.73(a). See also 33 U.S.C. § 1326(a) ("taking into account the interaction of such thermal component [of the plant's discharge] with other pollutants..."); *Public Service Company of New Hampshire*, 10 ERC at 1261–62. Thus, EPA has clearly interpreted CWA § 316(a) to require that protection and propagation of a BIP in the receiving water to be assured, taking into account the adverse effects of the thermal discharges in combination with other stressors, rather than using a degraded community to set the baseline, as argued by the permittee.

EPA disagrees with the permittee that the Agency has "biased" or "distorted" the BIP standard under CWA § 316(a). EPA has assessed the potential effects of the power plant's thermal discharges on the BIP, while also appropriately taking other stresses on the BIP into account in its assessment of these effects. EPA has tried to devise permit limits that will assure the protection and propagation of the BIP vis-a-vis thermal discharges. EPA has not tried to impose thermal discharge limitations that by themselves would somehow overcome all other stresses to the BIP. At the same time, the Agency has not used these other

[1] To the extent that the comments of Representative Clausen cited by the permittee are inconsistent with the Conference Committee Report, see 1972 Legislative History, p. 264 (House Consideration of the Report of the Conference Committee, October 4, 1972), that report constitutes superior authority to the remarks of a single Congressman about the report.

stresses as an excuse for allowing greater thermal discharges that would themselves cause or contribute to the failure to assure the protection and propagation of a BIP in Mount Hope Bay. EPA's analysis demonstrates that BPS's thermal discharge has contributed to the failure to maintain a BIP in Mount Hope Bay to date. EPA has further demonstrated that the new thermal discharge limits in the permit are sufficient to reasonably assure that thermal discharges from the power plant will be removed as an impediment to protection and propagation of the BIP in Mount Hope Bay. These limitations, however, would not likely be sufficient to **actually** restore a BIP if nothing is done about the adverse effects of species losses to the power plant's cooling water intake structure or overfishing. These problems are, however, also being addressed. As EPA discussed in its July 22, 2002, Permit Determinations Document, strict fishing restrictions have been in place for a number of years and losses to the BPS cooling water intake will be substantially reduced as a result of this permit.

The permittee also states that fish populations in Narragansett Bay are **the** proper reference point for assessing the effects of BPS's thermal discharge on a BIP in Mount Hope Bay. EPA agrees that fishery data from Narragansett Bay provide one interesting reference point, but by no means the only one for assessing the plant's effects on the BIP in Mount Hope Bay. First, contrary to the permittee's comment, EPA does not agree that BPS has no effect on Narragansett Bay. The plant's thermal plume reaches into Narragansett Bay under some tidal conditions. Moreover, the thermal plume and cooling water intake affect spawning and nursery habitat in Mount Hope Bay for species that also spend time in Narragansett Bay. These waterbodies are physically and ecologically connected.

Second, the larger Narragansett Bay is not itself necessarily a healthy ecosystem. Its fish stocks are affected by power plant cooling water systems on the Providence River, overfishing, and other pollution problems. Overfishing is being addressed, and other problems might be as well, but it is not clear that Narragansett Bay is a true reference point for a BIP for Mount Hope Bay.

Third, as EPA has discussed in its July 22, 2002, Permit Determinations Document, and elsewhere in this document, the data indicate that Narragansett Bay fish abundance is different from that in Mount Hope Bay to a statistically significant degree. Fourth, the *Wabash* case cited to by the permittee does not contradict EPA's view. In *Wabash*, the Administrator did note that the utility had evaluated the effects of the power plant by comparing conditions in the stretch of river affected by the discharge with conditions in other stretches that were not affected. See *Wabash*, 1979 EPA App. LEXIS 24. The more important aspect of the Administrator's analysis in *Wabash*, however, turned on an assessment of fish abundance trends and species composition over time **within** the river segments being affected by the plant. Id. at 25–30. Thus, EPA paid considerable attention in *Wabash* to changes in the pre-thermal discharge abundance of particular species and the composition of the BIP after commencement of the thermal discharge. Id. at 25–40. With respect to the § 316(a) variance for BPS, EPA considered both abundance trends and species composition within Mount Hope Bay, as well as comparisons of abundance between Mount Hope Bay and Narragansett Bay. Furthermore, EPA considered the relationship of the plant's thermal discharges to "critical temperatures" for resident species making up the BIP. EPA's analysis has been reasonable, appropriate, and consistent with existing guidance. Nothing in the *Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements* (DRAFT) (EPA) (May 1, 1977) contradicts the manner in which EPA evaluated thermal effects from BPS.

4. Comment

PG&E-NEG stated that EPA erroneously interprets the meaning of the "balanced indigenous population" under CWA § 316(a) by adopting the view that alternative thermal discharge limits should be denied if plant operations could delay recovery of a species in Mount Hope Bay regardless of what caused the species' decline. The permittee argued that EPA cannot consider a thermal discharge's effect in delaying the recovery of a damaged "balanced, indigenous population" in evaluating proposed alternative thermal discharge under CWA § 316(a). The permittee further argued that EPA has offered no support for considering this factor and that doing so is inconsistent with the legislative history of the CWA, which, according to the permittee, indicates that "enhancement" of the balanced, indigenous population is not necessary to qualify for a § 316(a) variance. The permittee also commented that using this consideration effectively eliminates the "appreciable harm" standard that EPA has used in applying § 316(a) because under this approach virtually any harm could delay recovery. The permittee also argued that when Congress wanted the element of delayed environmental recovery to be considered when evaluating a variance, it said so. The permittee pointed to CWA § 301(h)(2) and 40 CFR § 125.61(f) as an example of such a case and distinguishes it from § 316(a).

Response

EPA denied the CWA § 316(a) variance and alternative thermal discharge limits sought by the permittee because the Agency determined that the power plant's existing discharge had resulted in "appreciable harm" to the "balanced, indigenous population of shellfish, fish, and wildlife (the "BIP") in and on Mount Hope Bay"—indeed, contributed to the collapse of that BIP—and because the Agency determined that the limits sought by the permittee would not be sufficient to assure the protection and propagation of the BIP. There were a number of bases for the latter conclusion. Only one was that the thermal discharge proposed by the permittee would "delay"— indeed, would likely preclude—the recovery of depleted fish populations. The permittee seems to allege, however, that the power plant cooling system operations have played no role in the depletion of fish populations in Mount Hope Bay. EPA's analysis disagrees. In fact, even the permittee admits that power plant operations have had a measurable impact on, at a minimum, 5 square miles of Mount Hope Bay. In addition, as is discussed in Chapter 6 of the July 22, 2002, Permit Determinations Document, and elsewhere in this document, EPA is supposed to consider the effects of thermal discharges in conjunction with other stresses to the BIP. Therefore, other factors contributing to the problem are not irrelevant to this evaluation.

The permittee argues that EPA is foreclosed from considering whether alternative thermal discharge limits would "delay" recovery of a BIP in determining appropriate thermal discharge limits under CWA § 316(a). EPA disagrees. CWA § 316(a) requires that alternative thermal discharge limits be sufficient to assure the protection and propagation of the BIP. If alternative limits would **prevent** the recovery of the BIP, they would not meet the standard of § 316(a). Alternatively if the limits would **allow or facilitate** that recovery, presumably they would meet the standard. However, if an analysis showed that one set of alternative thermal discharge limits would allow the recovery within one time frame, while another set of alternative limits would also eventually allow the recovery but only after an unreasonably longer time frame, EPA believes the Agency could consider this and potentially find that the latter limits do not adequately assure the protection and propagation of the BIP. Unreasonably delaying recovery is arguably inconsistent with the notion of assuring the protection and propagation of the BIP. Of course, if the difference in time for recovery was insignificant, EPA would also likely have authority to impose the less stringent limits. This makes sense in light of the purpose of the CWA, the Act's deadlines for achieving compliance with technology-based and water quality-based standards, the fact that EPA permits must be reissued every 5 years, and the fact that § 316(a) allows a variance from these standards only if the alternative limits "will assure" the protection and propagation of the BIP. In any event, this issue is <u>not</u> presented by this case. EPA did not reject the alternative limits proposed by the permittee on the grounds that they would allow, but unreasonably delay, the recovery of the BIP. See July 22, 2002, Permit Determinations Document, § 6.4.2. EPA rejected the permittee's proposed limits because, as stated above, the Agency concluded that the permittee's past thermal discharges have caused appreciable harm to the BIP, and its proposed future discharge would not assure the protection and propagation of the BIP. The latter conclusion is based on a number of factors, only one of which is EPA's conclusion that the permittee's proposal would **prevent** (not merely delay) the recovery of the BIP.

EPA's position does not amount to requiring thermal discharge limits that would somehow "enhance" the BIP. The limits EPA proposes are merely designed to assure the BIP's protection and propagation. Furthermore, there is nothing about the Agency's approach that would eliminate the appreciable harm standard as stated in the regulations. 40 CFR § 125.73(c). See also *Wabash*, 1979 EPA App. 4, 16 (the "plain language of . . . [the regulations] establishes a test which equates a finding of 'appreciable harm' with a failure to satisfy the statutory requirements of protecting a balanced, indigenous aquatic community"). The term "appreciable harm" is not defined in the regulations, but it would be reasonable to interpret the phrase to encompass the effects of a thermal discharge causing a significant delay in the recovery of a BIP. See also *Wabash*, 1979 EPA App. 4, 40 (in a § 316(a) variance determination, it is appropriate to consider worst-case conditions and period of time that species would be affected by the discharge, and the amount of time that would be needed to reverse these effects). In any event, as explained above, this issue is not presented by this case because our § 316(a) determination does not turn on the issue of a mere delay to the recovery of the BIP.

Finally, EPA concludes that there is nothing about CWA § 301(h)(2), 33 U.S.C. § 1311(h)(2), or 40 CFR § 125.62(f)(3)[2] – which relate to secondary treatment variances for publicly owned sewage treatment plants – that is inconsistent with EPA's interpretation of CWA § 316(a) and the appreciable harm standard or that renders that interpretation unreasonable or inappropriate.

5. Comment
Citing EPA's decision *In the Matter of Public Service Company of Indiana, Wabash River Generating Station*, 1 EAD 590, 603–05 (Nov. 29, 1979), the permittee stated that the Agency believes that "significant [adverse] effects on relative abundance" may be acceptable in some cases under CWA § 316(a) and might even countenance the "virtual elimination" of certain species from the balanced indigenous population.

Response
EPA agrees that the *Wabash* permit appeal decision suggests that the Agency interpreted CWA § 316(a) in that case to allow that a significant reduction in abundance for some individual species **might be acceptable in some cases** without undermining adequate protection of the overall balanced, indigenous population of shellfish, fish, and wildlife in and on the receiving water. Of course, the decision also indicates that in other cases this would not be acceptable. It would depend on the facts of the case. Also, EPA does not read *Wabash* to necessarily indicate that "virtual elimination" of certain species from the BIP would be acceptable.

In any event, EPA thinks that significant adverse effects on individual species within the BIP could possibly be acceptable only where the overall BIP was otherwise generally healthy in terms of abundance and composition. The Agency believes the *Wabash* decision supports this view. Only in such circumstances might the Agency be able to conclude that assurance of the protection and propagation of the overall BIP was not compromised despite some effect on, for example, one or two individual species. These are not, however, the circumstances that exist with respect to Mount Hope Bay. The BIP in Mount Hope Bay has been seriously damaged, with substantial abundance declines for numerous species and the community as a whole, as well the appearance of some shifts toward more thermally tolerant species.

In *Wabash*, EPA states that "each Section 316 proceeding, by its very nature, is necessarily unique." 1979 EPA App. LEXIS at 20 (citing, *In the Matter of Public Service Company of New Hampshire (Seabrook*

[2] The permittee cites to "40 CFR § 125.61(f)," Foley Hoag Comments, p. 51 n. 97, but there is no such regulation. From the context of the comment, EPA believes that the permittee made a typographical error and meant to reference 40 CFR § 125.62(f). EPA has considered and responded to the comment on that basis.

Station, Units 1 and 2), NPDES Appeal No. 76-7 (August 4, 1978), 1978 EPA App. LEXIS 17, 81). The Agency also states that in assessing impacts on a BIP, effects on both individual species and the community as a whole must be considered, and a focus on community-level effects should not be allowed to obscure important impacts on individual species. 1979 EPA App. LEXIS at 21–22, 25. Therefore, the relative importance of particular degrees and types of impact could vary in different cases.

In *Wabash*, the facts apparently indicated that "while overall diversity and abundance may have been fairly constant, the emerging trends in the effects on individual species are disturbing." *Id.* at 26. EPA was clear that a significant change in overall community abundance or species composition within a community due to thermal discharges (e.g., from a cold-water assemblage to a warm-water one, or from a river community to a lake community) would be at odds with § 316(a), which, the Administrator underscored, should be interpreted in light of the CWA's overarching purpose of restoring the biological integrity of the Nation's waters. *Id.* at 28. The Administrator stated that it was difficult to assess the relative weight to give to the individual species problems that were evident versus the "comparative stability of the overall community indices." *Id.* at 31. He also stated that if making that assessment was the only question about the Regional Administrator's decision granting the variance, he might have been inclined to uphold the decision because it was not "clearly erroneous."

However, the Administrator **did** remand the decision to the Region because of its failure to adequately consider effects during potential "worst-case" low-flow conditions in the river. *Id.* at 31–41. EPA noted that data indicated that upper critical temperatures for various species would be exceeded in various river stretches owing to the plant's thermal discharge under worst-case conditions and that this heightened concern over the plant's ability to assure the "required protection of the aquatic community." *Id.* at 39. The Administrator also reasoned that because the permittee admitted that it would take a few years before the observed effects of the discharges on certain species could be reversed, "it is not unreasonable to infer that the discharges might have a substantial adverse effect on the aquatic community at the Q [7-10] level, causing a larger number of species to be adversely affected and for longer periods of time." *Id.* at 40. The Administrator's discussion appears to indicate that this type of effect would likely not be acceptable under § 316(a). As a result, the Administrator remanded the permit to the Regional Administrator to consider appropriate modifications to the permit, which the Administrator stated **might** include options such as requiring compliance with State water quality standards under certain flow conditions or at one of the permittee's two power plants on the river. *Id.* at 41.

EPA's § 316(a) variance determination for BPS is based on the specific facts of that case. It is not inconsistent with EPA's permit appeal decision in *Wabash*.

6. Comment

PG&E-NEG stated that EPA fails to meaningfully respond to the permittee's biological analyses and that although Region 1 participated in a number of studies conducted by the permittee, the Region "ignores what those analyses demonstrate." The permittee asserted that the Region "offers no in-depth biological analysis of its own" and, instead, "relies on little more than a review that consists of little more than speculative assertions of possible environmental effects, conclusory rejections of BPS's methods, and misleading and inaccurate references to pre-existing studies, the relevance of which EPA does not even attempt to demonstrate." The permittee then stated that speculative assertions regarding harm that might occur or some shortcoming in the permittee's analysis are not a "meaningful 'rebuttal'" of the permittee's § 316(a) demonstration.

Response

EPA has carefully considered the permittee's biological analyses, and has responded to the permittee's findings in detail in EPA's July 22, 2002, Permit Determinations Document and elsewhere in these responses to comments. In fact, EPA has worked with PG&E-NEG to determine the best method for predicting thermal impacts on the biological community of Mount Hope Bay. EPA, members of the BPS Technical Advisory Committee (TAC), and PG&E-NEG and its consultants engaged in a multistep process to assess thermal effects from the operations of BPS. This collaborative effort began in 1997 and continued into 2001. Phase 1 was to derive a hydrodynamic model that would be able to predict thermal plume movements around Mount Hope Bay at multiple depths in the water column. A subcomponent of this model to be developed was supposed to be able to predict the effects of the thermal discharge on the dynamics of dissolved oxygen.

After several years of work by the permittee's consultant Applied Science Associates, the permittee, and some members of the TAC, the parties reached a general consensus that the hydrothermal model was a reasonable tool to predict the location and temperature of the discharge plume. The model was calibrated with data collected from arrays of thermistors in Mount Hope Bay and comparisons with NASA satellite images of Mount Hope Bay. Thus, concerns of underpredicting the size and extent of the thermal plume, which has been a problem with previous models submitted by BPS, were assuaged by calibrating this model with actual field data. As a result, in assigning impacts and thermal changes associated with various heat load scenarios, EPA is relying on the hydrothermal model developed by the permittee in collaboration with the TAC. Unfortunately, PG&E-NEG was not able to produce the model subcomponent predicting thermal effects on dissolved oxygen concentrations.

Phase 2 was to integrate the capabilities of the hydrodynamic model with a predictive assessment of biological effects. This was to be accomplished in two ways. For winter flounder, a RAMAS population model was to be used to assess entrainment and impingement impacts. A habitat suitability model was to be devised to feed into the RAMAS to examine the impact of the thermal plume on winter flounder. For about 10 species other than winter flounder, a review of relevant scientific literature on water temperature thresholds was completed. In interpreting the results of the various studies, there was general disagreement about the approach and application of this information between members of the TAC and the consultants to PG&E-NEG. The consultants to PG&E-NEG produced an analysis that derived temperature polygons for each species. These temperature polygons used chronic and acute mortality limits and, if available, avoidance and cold shock temperatures to derive "acceptable" temperatures for each species examined. The concept of thermal acclimation was applied in the derivation of the polygons. EPA and members of the TAC had numerous disagreements over the specifics details of the temperature polygons. Instead of recapping all the specific disagreements, EPA refers the reader to Chapter 6 of the EPA Permit Determinations Document. MA DEP, MA CZM, MA DMF, and RI DEM all submitted letters detailing their concerns on this issue, among others, and those letters are included in the appendices of the Permit Determinations Document.

It is worthwhile revisiting the question of thermal acclimation and its application in the temperature polygons. EPA acknowledges that thermal acclimation occurs in nature; however, the Agency disagrees with PG&E-NEG regarding the speed and magnitude of this process. PG&E-NEG relies heavily on laboratory studies that show it is possible for a certain fish species to survive up to a specific temperature when acclimated to a second lower temperature. These studies might establish what the species of interest can physiologically withstand, but they do not address what are optimal temperatures nor what is typical from a behavioral point of view. The TAC believed that the reliance on laboratory studies would tend to overstate the effects of acclimation in actual, real-world conditions.

The TAC also believed that PG&E-NEG's polygon method was limited in that it did not take into consideration the effect of temperature on ecological processes. For example, the work by Keller and Klein-MacPhee (2000) has demonstrated that small increases in winter water temperature lead to increased predation by sand shrimp, resulting in significant reductions in winter flounder egg and larval survival rates. This is a critical ecological component not captured in PG&E-NEG's temperature polygon method.

Finally, EPA and the TAC frequently viewed the results of the scientific literature differently than PG&E-NEG. The following is presented as a generic example of these different viewpoints. A population is composed of many individuals, all with their own temperature preferences. If one were to study the temperature preferences of this theoretical population, one would find that some individuals are affected at lower temperatures than others; but as temperatures continue to increase, 100 percent of the individuals are affected. In the scientific literature, one can find studies where researchers document the temperature where they first begin to see a biological effect (i.e., when the first individual reports being hot) and the point where they see that 100 percent of the population is experiencing the effect. The TAC preferred to adopt the lower temperature, which arguably could represent a no-effects level. PG&E-NEG preferred to focus on the point at which 100 percent of the population would demonstrate an effect. As a compromise the TAC and PG&E-NEG initially discussed using the assumption that there was a linear increase of effects between these two points. Members of the TAC were not comfortable with that assumption, however, because biological effects can frequently be triggered by all-or-nothing threshold concentrations and not a more gradual response. Literature on dose-response curves for thermal studies show that biological responses tend to be rapid with incremental temperature increases between a 50 percent and a 100 percent biological response (Coutant 1972).

Taking these differences into consideration, EPA decided to adopt the following approach to assessing thermal effects from BPS. EPA used the results from the predictive hydrothermal model and compared the output from numerous model runs with critical threshold temperatures agreed upon by the TAC. These critical threshold temperatures considered ecological consequences of the thermal discharge by targeting temperatures that resulted in lower predation rates on winter flounder eggs and larvae as detailed by Keller and Klein-MacPhee (2000). EPA chose threshold temperatures that represented an acceptable level of impact but did not represent a zero impact temperature. For example, winter flounder begin to show increased burrowing and decreased feeding activity at temperatures above 20 ºC. Temperature avoidance by juvenile winter flounder occurs at 24 ºC (Duffy and Luders 1978, Casterlin and Reynolds 1982), and EPA chose this as its target threshold temperature. This temperature clearly is in excess of a no-effects level, but the ecological impact of increased burrowing and decreased feeding is difficult to determine. However, avoidance of an area clearly is in conflict with EPA's duty to assure the protection and propagation of the balanced, indigenous population of Mount Hope Bay.

EPA believes that the use of target threshold temperatures is reasonable and appropriate in this case. It is more protective than PG&E-NEG's temperature polygon method but EPA believes this approach is warranted because of the dire condition of marine life in Mount Hope Bay and in light of EPA's duty under the CWA to "assure" the protection and propagation of the BIP. EPA has done a great deal more than just critique PG&E-NEG's approach and has put much thought and independent analysis into its decisions.

Casterlin, M.A. and W.W. Reynolds. 1982. Thermoregulatory behavior and diel activity of yearling winter flounder, *Pseudopleuronectes americanus* (Walbaum). Env. Biol. Fish. 7, pp 177–180.

Coutant, C.C. 1972. Biological aspects of thermal pollution II. scientific basis for water temperature standards at power plants. *CRC Critical Reviews in Environmental Control*, 3(1), pp 1–24.

Duffy, J.J. and G. Luders. 1978. Estimation of finfish temperature preference and avoidance in Mount Hope Bay. Report for New England Power Service Company, TR-1142-3, 70 p.

Keller, A.A. and G. Klein-MacPhee. 2000. Impact of elevated temperature on the growth, survival, and trophic dynamics of winter flounder larvae: a mesocosm study. Can. J. Fish. Aquat. Sci. Vol. 57, pp 2382–2392.

7. Comment

PG&E-NEG objected to EPA's statement that BPS's thermal impacts "in conjunction with the high quantity of impingement entrainment losses certainly will not allow for the recovery of winter flounder or the wider balanced indigenous community." The permittee argued that it has submitted "convincing evidence demonstrating that there has been no significant historical difference in abundance trends in Mt. Hope Bay and in Narragansett Bay. . . ." The permittee further argued that Narragansett Bay "is unaffected by BPS's operations" and that, therefore, the permittee has successfully made a "retrospective showing that there has been a lack of appreciable harm to the balanced indigenous community in Mt. Hope Bay as a result of BPS's [past] operations." The permittee argued that "EPA has provided no adequate scientifically sound basis for rejecting these conclusions." The permittee further stated that its revised "RAMAS modeling demonstrates that the fish populations in Mount Hope Bay will recover under the permit limits BPS has proposed [and that] . . . EPA's proffered reasons for rejecting the predicted (sic) RAMAS modeling are equally unsupported as well as misleading."

Response

EPA maintains that there is indeed a statistical difference between fish abundance in Mount Hope Bay and Narragansett Bay. For a detailed discussion of EPA's view of PG&E-NEG's analysis comparing fish populations in these two water bodies, see our responses regarding Section 316(b) issues elsewhere in this document. EPA does not agree with PG&E-NEG's contention that operations at BPS are not impacting Narragansett Bay. NASA satellite images show that on some stages of the tide the thermal plume from BPS extends into Narragansett Bay. Additionally, many of the fish species in Mount Hope Bay reside there for only part of the year and inhabit Narragansett Bay at other times. For example, adult winter flounder move into Mount Hope Bay to spawn and then move out again as water temperatures rise. Some percentage of these adults reside in Narragansett Bay. Thus, any impacts from water withdrawal or thermal discharge that affect successful reproduction and development of the winter flounder spawning stock of Mount Hope Bay will negatively affect the population in Narragansett Bay. The permittee also suggests that the there may be a net contribution of winter flounder larvae from Narragansett Bay to Mount Hope Bay. If this is true, then entrainment losses at BPS would represent a negative impact to Narragansett Bay.

Finally, EPA believes that the RAMAS model does not accurately replicate the past fluctuations of winter flounder populations in Mount Hope Bay. Although PG&E-NEG has added cormorant predation to the model to account for the disparity between its model predictions of populations in the 1990s and actual abundance data, it overstates the importance of this source of mortality. In addition, cormorant predation does nothing to explain discrepancies between model output and actual abundance data for the mid-1970s. These discrepancies suggest that the predictive capability of this model is unreliable. EPA discusses this issue further elsewhere in this document.

8. Comment

PG&E-NEG stated that EPA questions the use of the "acclimation concept" but contradicts itself by citing studies and reports that rely on the acclimation concept and confirm its validity. They argued that EPA's own consultants, Coutant and Bevelhimer, as well as Mark Gibson of RI DEM, have each endorsed the use of acclimation generally and for Mount Hope Bay in particular.

Response

EPA does not question the general concept of acclimation temperature, but, as previously explained, EPA questions PG&E-NEG's application of it. Detailed discussion of the acclimation temperature issue is provided in other responses to comments in this document.

9. Comment
PG&E-NEG stated that the thermal discharge limits set by EPA in the Draft NPDES Permit under CWA § 316(a) were arbitrarily selected. The permittee argued that the limits are "not based on biology at all, as required by CWA § 316(a)." Instead, according to the permittee, the thermal discharge limits are based on the reduction of highway fogging and icing as a result of cooling tower operation. The permittee stated that while public safety may be an important consideration for **other** (emphasis in original) CWA provisions, a § 316(a) determination is supposed to be based on biological considerations.

Response
EPA agrees with the permittee that CWA § 316(a) variance determinations must be made solely on the basis of the biological criteria stated in that provision of the statute. (EPA notes that this contradicts the permittee's other comments calling for economic issues to be factored into the § 316(a) determination.) The permittee is **incorrect**, however, in stating that EPA determined the permit's thermal discharge limits based on avoiding alleged problems related to cooling tower water vapor plumes. EPA's § 316(a) variance-based thermal discharge limits for the permit were based solely on application of the biological criteria from CWA § 316(a). The Agency simply noted that since it was authorizing, on biological grounds, some additional thermal discharge beyond what could be achieved by full application of the cooling tower technology, the permittee could engineer the system to allow bypass of the towers which could then be used to reduce or eliminate any vapor plume problem. The actual basis of EPA's variance-based thermal discharge limits and EPA's consideration of the vapor plume issue are discussed in detail elsewhere in this document and in Chapters 6 and 7 of EPA's July 22, 2002, Permit Determinations Document.

10. Comment
PG&E-NEG stated that there is no "discernible biological difference" between thermal discharge limit of 1.7 TBtus proposed by EPA, and the thermal discharge limit of 28 TBtus, as proposed by the permittee. The permittee argues, therefore, that EPA was wrong to deny the § 316(a) variance-based thermal discharge limits proposed by PG&E-NEG.

Response
EPA believes that there is a significant difference in the biological impact of the two proposed thermal limits. For example, the size and extent of the thermal plume would be dramatically different between the enhanced multi-mode option and EPA's proposed permit limits. EPA's thermal discharge limit will result in only 10 percent of the bottom waters of Mount Hope Bay exceeding the critical temperature threshold for winter flounder avoidance. In contrast, PG&E-NEG's enhanced multi-mode option would result in 62 percent of the volume of the bottom waters exceeding this threshold temperature. EPA's thermal discharge limit will allow over 50 percent more of the bay to retain water temperatures suitable for juvenile winter flounder. This percentage equates to more than 7 square miles of habitat that will be protected under EPA's permit. EPA believes that a difference of impact area of 7 square miles of habitat constitutes a "discernible biological difference," especially considering that the bay as a whole covers a total of 14 square miles. In addition, the thermal discharge limits proposed by the permittee would allow substantially more heat to be added to the bay compared to EPA's proposed limits. This would give greater stimulus to other adverse environmental effects that are promoted by heat (e.g., increased sand shrimp predation of winter flounder larvae and eggs, depressed dissolved oxygen levels, increased nuisance and thermo-tolerant species, and a greater likelihood of disrupting normal fish migration).

11. Comment
PG&E-NEG stated that EPA's use of the evaluation criteria from the 1977 CWA § 316(a) implementation guidance document is "subject to challenge." The permittee complained that CWA § 316(a) mentions fish, shellfish, and wildlife, and not lower trophic levels, but the guidance document addresses these lower levels and EPA considered them in evaluating § 316(a) issues related to BPS. Furthermore,

according to the permittee, EPA did not establish that "any changes in the lower trophic levels or food web have actually occurred" or that any such changes have affected higher levels or have been caused by BPS. The permittee stated that "EPA behaves as if failure to meet the Guidance criteria is itself reason to disallow BPS' request," yet it is not appropriate to use the Guidance in this prescriptive manner. The permittee asserted that before guidance can be used in a manner that gives it binding effect, it must be subjected to notice and comment procedures.

Response

EPA agrees that the *Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements* (DRAFT) (EPA) (May 1, 1977), cannot be used by the Agency as if it had binding legal effect. It is only a guidance document, rather than a law or regulation. Indeed, it is only a draft guidance document. It did not go through formal public notice and comment procedures. Furthermore, the Draft Guidance itself states quite clearly that it does **not** have binding legal effect. *Id*. at §§ 2.2.1 and 2.2.2.

All of this creates no problem, however, because EPA did not use the 1977 Draft Guidance as if it had binding legal effect in developing the new NPDES permit for BPS. EPA simply looked to the Draft Guidance as an advisory document concerning possible ways to analyze thermal discharge issues under § 316(a), and then used some of the analytical constructs suggested by the document to the extent that they made sense in this case. EPA **did not** use the decision criteria suggested in the Draft Guidance as if they provided legal preconditions to a variance under CWA § 316(a). Furthermore, EPA **did not** order the permittee to conduct any particular analysis suggested by the Draft Guidance. Moreover, the Agency conducted analyses beyond those suggested in the Draft Guidance when it seemed appropriate in order to properly apply the tests from the statute and regulations. EPA's permit decision was reached on the basis of the proper application of the applicable law and regulations, rather than any rigid application of the 1977 Draft Guidance. Under the principles expressed in *General Electric Co.* v. *EPA*, 290 F.3d 377 (D.C. Cir. 2002), cited by the permittee, EPA used the 1977 Draft Guidance properly. (EPA also notes that in several instances the permittee itself cites the 1977 Draft Guidance, or other guidance documents, to support points made in its comments.)

The permittee also complained that the Draft Guidance suggests that the effects of thermal discharges on "lower trophic levels" of organisms should be considered, rather than limiting consideration to "shellfish, fish and wildlife" as stated in CWA § 316(a). First, it should be noted that EPA's evaluation for the BPS permit considered thermal effects on lower trophic levels, but focused most significantly on impacts to fish. Second, EPA believes it was well within its discretion to interpret the term "balanced, indigenous population of shellfish, fish, and wildlife" as used in CWA § 316(a) (the "BIP") to include lower trophic levels of animal life (e.g., zooplankton, meroplankton). See 1977 Draft CWA § 316(a) Guidance, p. 74. Furthermore, even if plant life may not be itself part of the "balanced, indigenous population of shellfish, fish, and wildlife," it is also appropriate to consider thermal effects on certain plant life (e.g., phytoplankton, habitat-forming plants) because of the role it may play in supporting the BIP. In addition, PG&E-NEG included eelgrass, which is a lower trophic level, within its own analysis.

Neither the phrase "balanced, indigenous population of shellfish, fish, and wildlife," nor the individual terms "fish," "shellfish," or "wildlife" are defined in the statute. It is obvious, however, that many of the lower trophic level organisms evaluated by EPA are simply the early life stages of fish, shellfish, and other wildlife (e.g., meroplankton include fish larvae and eggs). Moreover, they also constitute an important part of the food chain. Maintaining sufficiently healthy, balanced populations of lower trophic level organisms is necessary to maintain adequate balance at higher trophic levels. The regulatory definition of "balanced indigenous population" refers to the broad concept of a "biotic community," including "necessary food chain species." 40 CFR § 125.71(a). This clearly encompasses consideration of lower trophic level life forms. This is also consistent with the broad dictionary definition of the term "wildlife," which, according to the *American Heritage Dictionary* (2d College Edition), means "[w]ild animals and vegetation, esp. animals living in a natural, undomesticated state."

Furthermore, the Conference Committee Report for the CWA of 1972 discussing CWA § 316(a) states that variance applicants must "show that elements of the aquatic ecosystem which are essential to support a 'balanced indigenous population of fish, shellfish and wildlife' would be protected" CWA of 1972, L. History, p. 175. Phytoplankton and various types of "habitat formers" (e.g., eelgrass) are clearly plant life that may be an essential element of the ecosystem supporting the protection and propagation of the BIP, due to their respective functions as primary producers and providers of important habitat features. Thus, even if one concludes that plant life is not part of the BIP, Congress clearly intended that thermal effects on some types of plant life should be considered. (Similarly, even if one argued that lower trophic levels of fish, shellfish and wildlife were not themselves part of the BIP, effects on them would need to be evaluated in this context.) Thus, the Draft Guidance quite properly suggests that effects on both phytoplankton and habitat formers be considered, and EPA did so in developing the NPDES permit for BPS.

EPA also disagrees that it has failed to discuss changes in the lower trophic levels of the Mount Hope Bay ecosystem and BPS's role in causing or contributing to those changes. EPA has adequately discussed these changes and impacts in Chapters 6 and 7 of the July 22, 2002, Permit Determinations Document and elsewhere in this document.

12. Comment

PG&E-NEG stated that EPA's "biological community" level evaluation for its CWA § 316(a) analysis is "fatally flawed." The permittee noted that EPA's analysis follows the Agency's 1977 Guidance, but the permittee argued that EPA's conclusions are "speculative" and cannot be relied upon as a basis to deny PG&E-NEG's variance request.

Response

Contrary to the permittee's statement, EPA did not base its conclusions regarding thermal impacts on Mount Hope Bay's biological community on mere speculation. Rather, EPA relied on numerous scientific studies, including analyses submitted by the permittee, to evaluate the full spectrum of environmental stressors and effects in Mount Hope Bay. EPA used the 1977 Draft Guidance primarily as a framework for considering and presenting information on thermal effects from BPS. By organizing the information in this fashion, it became apparent that observed problems with multiple, disparate biological communities could reasonably be explained by elevated water temperatures (in some cases in conjunction with other factors) and were not likely explained by other stressors. EPA denied PG&E-NEG's requested § 316(a) variance-based limits on the basis of a number of points including the following:

- First, a balanced indigenous community of fish, shellfish, and wildlife does not currently exist in Mount Hope Bay.
- Second, EPA believes that thermal discharges (and cooling water withdrawals) by BPS have caused or significantly contributed to the collapse of finfish populations in Mount Hope Bay.
- Third, EPA believes that permit limits based on PG&E-NEG's Enhanced Multi-Mode proposal would result in substantial thermal impacts on the biological community, as well as the loss of significant numbers of organisms due to entrainment and impingement. Overall, EPA believes that such permit limits would continue to result in substantial harm to aquatic life in Mount Hope Bay, and thus would not allow for the protection and propagation of the balanced indigenous community.

EPA's decision process included both retrospective and predictive assessments. Under the former, EPA concluded that the permittee's existing thermal discharges had caused appreciable harm to the BIP. Under the latter, EPA concluded that although the Enhanced Multi-Mode proposal would achieve a reduction in plant thermal discharges (and water withdrawals), the substantially greater reductions in thermal discharge and intake flow required by this permit are necessary to assure the protection and propagation of the balanced indigenous community of Mount Hope Bay **going forward**. For detailed discussions of EPA's biological community evaluation, see Chapter 6 of the July 22, 2002, Permit Determinations Document and responses elsewhere in this document.

13. Comment

PG&E-NEG characterized EPA's conclusion that adverse effects on phytoplankton might result from the thermal discharge limits associated with the permittee's proposed "Enhanced Multi-Mode" cooling system (i.e., 28 TBtu) as "unadorned speculation." The permittee stated that although EPA states that there is a "reasonable probability" that nuisance algae blooms will continue with the Enhanced Multi-Mode discharge level, there has been only one such bloom in 30 years of plant operations at higher levels. The permittee further stated that EPA knows nothing about the prevailing temperatures at the time of this single algae bloom. The permittee stated that EPA has not explained why more blooms would be caused by a discharge of 28 TBtu when the current discharge of 42 TBtu has only caused one such bloom in 30 years, nor has EPA shown that BPS's discharge had anything to do with that single bloom. The permittee also stated that it has demonstrated that blue-green algae blooms have been occurring with increasing frequency along the Atlantic Coast in locations where BPS's thermal discharge has no effect and these blooms "appear to be associated with nitrogen loadings, whereas BPS is not a significant source of nitrogen."

Response

In general, higher temperatures and elevated nitrogen concentrations are conditions that favor blue-green algae over other algal species in marine or estuarine environments. EPA agrees that BPS's thermal discharge does not add nitrogen to Mount Hope Bay, but it does elevate water temperatures and add substantial quantities of heat to the bay. This addition of heat contributes to conditions that favor nuisance blue-green algal species.

Moreover, the permittee's statement that only one bloom has occurred in the 30 years that BPS has been in operation is not based on actual monitoring data. Detecting the presence of blue-green algae has never been a part of the routine monitoring program for BPS. The aforementioned bloom in 2000 was detected because a substantial quantity of a then unknown substance became caught on the intake screens. MRI collected samples of this substance for analysis by academic experts, who identified it as blue-green algae. PG&E-NEG speculates that, because the intake may have only been clogged by a large quantity of blue-green algae once in 30 years, only one algal bloom has occurred. In reality, the actual frequency of these blooms in Mount Hope Bay is unknown. EPA views the large bloom in 2000, in conjunction with a number of other observations, as a sign of an ecosystem that is severely stressed.

The permittee also suggested that the enhanced multi-mode option will eliminate the potential for any further reoccurrence of blue-green algal blooms. While EPA agrees that the enhanced multi-mode option would achieve a reduction of the mass flux of heat into the bay on an annual basis, it would still result in a substantial thermal plume across the majority of the bay (Figure 1). The predicted size of the thermal plume leads EPA to believe that the enhanced multi-mode proposal is unlikely to do much to lower the probability of future blue-green algal blooms. EPA's permit limits will result in a substantial reduction in not only the mass flux of heat, but also the size of the thermal plume. EPA believes this represents a significant reduction in the potential for future nuisance algal blooms.

14. Comment

PG&E-NEG said that EPA's hypothesis that heat discharged by BPS may be helping to suppress the "'normal' winter-spring algae bloom" in Mount Hope Bay is not adequately supported. The permittee stated that the research cited by EPA indicates that the "normal winter-spring bloom" has also been absent from Narragansett Bay, which, according to the permittee, "is indisputably not touched by BPS' thermal plume." The permittee argued, therefore, that it is "highly unlikely" that BPS played a significant role in the disappearance of the normal winter-spring bloom or that thermal discharge modifications at BPS could "play a significant role in bringing it back." The permittee concluded that EPA "must" discard these considerations from its analysis because of the lack of support for them. The permittee also commented, however, that EPA has ignored actual field data that suggests that current phytoplankton populations are similar to those observed in historical data from 1972 to 1985.

Response

EPA disagrees with this comment in several respects. First, as explained elsewhere in this document, EPA does not agree that BPS's thermal plume neither reaches nor affects Naragansett Bay. Second, the absence of a normal winter-spring bloom in Narragansett Bay does not demonstrate that thermal discharges from BPS have not caused or contributed to the suppression of the normal winter-spring bloom in Mount Hope Bay. Narragansett Bay is also subject to a variety of environmental stressors, including thermal impacts, and therefore may also exhibit some of the "symptoms" of environmental stress.

Third, EPA has not only considered actual field data, but has sought more recent data than that offered by PG&E-NEG. EPA obtained data from Mark Berman of the National Oceanic and Atmospheric Administration (NOAA), who has collected more recent and comprehensive data in Mount Hope Bay than the MRI data to which the permittee referred. Dr. Berman's recent field sampling has failed to detect a normal winter-spring phytoplankton bloom in Mount Hope Bay for the past several years.

Keller et al. (1999), the study cited by EPA, points to increases in water temperature as a critical factor in eliminating the normal winter-spring algae bloom. A change in normal phytoplankton bloom dynamics has been observed in Mount Hope Bay. Similar changes have been noted elsewhere and explained by elevations in water temperature. The MRI data set is limited in replication and number of samples, but even this data set shows shifts in relative abundance of phytoplankton groups. Considering these facts, EPA concludes that BPS, which elevates the water temperature of Mount Hope Bay, may be a factor contributing to this change in the normal phytoplankton bloom dynamics.

Keller, A.A., C.A. Oviatt, H.A Walker, and J.D. Hawk. 1999. Predicted impacts of elevated temperature on the magnitude of the winter-spring phytoplankton bloom in temperate coastal waters: A mesocosm study. *Limnol. Oceanog.*, Vol. 44(2), pp 344–356.

15. Comment

With respect to the effects of the BPS thermal discharge on zooplankton, PG&E-NEG stated that EPA concludes that the permittee's proposed permit limits insufficiently reduce thermal discharges from existing conditions because the heat might promote ctenophore blooms (i.e., expand their range and time of distribution), which could lead to increased natural mortality rates for winter flounder larvae and eggs both because ctenophores feed on them and because ctenophores feed on other zooplankton that otherwise provide food for winter flounder larvae. The permittee argued that this conclusion is "unfounded." According to the permittee, EPA's sole source of support for this conclusion is a paper by Sullivan et al. (2001), which found only a weak correlation between temperature and the timing of ctenophore blooms and no significant relationship between temperature and the magnitude of a bloom. The permittee stated that Sullivan (2001) concluded that the availability of food is the key factor determining these blooms and that she could not conclusively determine the cause of past blooms in Narragansett Bay. The permittee also stated that the "biological preconditions" for an "early bloom" have not been demonstrated to exist in this case. The permittee argued that if earlier ctenophore blooms were occurring in Mount Hope Bay one would expect to see reduced zooplankton abundance and a shift from pelagic to demersal fish species, but this has not occurred. The permittee also argues that EPA's other references on this issue consist of a newspaper article and a couple of personal communications and that the Agency "cannot properly rely on such data and information that are known only to the Agency and have not been exposed to public scrutiny and comment."

Response

The permittee suggested that earlier ctenophore blooms have not occurred because no reduction in zooplankton and no shift from pelagic to demersal fish has occurred. However, EPA employees observed large quantities of ctenophores in Mount Hope Bay and on the intake screens of BPS in February 2001. Normally, ctenophores do not occur in these waters until July or August. Rhode Island DEM employees have noted the presence of large quantities of ctenophores in Mount Hope Bay on at least two occasions during their monthly trawl survey (June 1998, January 1999) (Lynch, pers. comm.). Dr. Sullivan attributed the timing of these early blooms to a number of factors, including water temperature. EPA never claimed that water temperature was the sole factor contributing to these blooms, but the Agency notes that Dr. Sullivan did see a positive correlation between water temperature and timing of the blooms. Based on these observations, and the fact that thermal effluent from BPS elevates water temperature in Mount Hope Bay, EPA believes BPS may be contributing to these early ctenophore blooms in Mount Hope Bay.

The permittee cites *Portland Cement Ass'n* v. *Ruckleshaus*, 486 F.2d 375, 393 (D.C. Cir. 1973), for the proposition that EPA may not rely on information in personal communications that have not been exposed to public scrutiny and comment. First, this is an overbroad statement of the principle stated by the court in *Portland Cement*. In that case, the court remanded a regulation to EPA because critical data underlying the rule had not been made part of an administrative record and subject to public review. This is inapposite to this permit development process because EPA has made the information that it has relied upon available to the permittee. To the extent that information is based on a personal communication, EPA has documented it in the record and made it subject to public review. EPA also notes that it did not rely unduly on such information, and that the permittee itself in its comments also cites personal communications (while providing EPA with no documentation of those communications).

Lynch, Tim, Rhode Island DEM, Pers. Comm. 9/11/2003.

Sullivan, B.K., D. Van Keuren and M. Clancy. 2001. Timing and size of blooms of the ctenophore *Mnemiopsis leidyi* in relation to temperature in Narragansett Bay, RI. Hydrobiologia, Vol. 451, pp113-120.

16. Comment

PG&E-NEG indicated that EPA cites "Maas" (*sic*) (2002) for the proposition that "'increased predation [of winter flounder larvae] by sand shrimp may be a temperature mediated phenomenon that BPS is contributing to significantly." The permittee states that EPA should not rely on this paper to support "the theory that higher temperatures increase predation by sand shrimp and thus lower larval survival" because "increased mortality for winter flounder larvae can also be readily explained independent of temperature."

Response

EPA has not relied solely on Haas (2002) in suggesting that higher temperatures increase predation by sand shrimp and thus lower the survival of larval winter flounder. Haas (2002) is one of two supporting pieces of evidence that EPA cited to support this point in its § 316(a) analysis. EPA also cited to Keller and Klein-MacPhee (2000) who conducted a mesocosm experiment that showed dramatic reductions in the survival rates of larval winter flounder associated with small increases in winter water temperatures.

The reduction in winter flounder survival rates corresponded with changes in sand shrimp activity levels, which increased in response to the warmer water.

Haas (2002) refers to a personal communication from David Taylor of the University of Rhode Island to staff members of MA DEP. Taylor explained that his work showed that sand shrimp prey on winter flounder during the winter in the field, not just in enclosed tanks. EPA also points out that Taylor presented these findings at the most recent meeting of the New England Estuarine Research Society (NEERS) in the spring of 2003, also attended by many representatives from the permittee, where he reiterated the results that he had communicated to MA DEP. Taylor also conducted laboratory studies to measure consumption rates of flounder eggs at different water temperatures. He found that as water temperatures increased, the rate of egg predation increased significantly. Since his presentation at NEERS, Taylor has informed EPA that his findings have been accepted for publication by the peer-reviewed journal *Marine Ecological Progress Series*.

Based on the above information, EPA concludes that small elevations of winter water temperature do pose a risk for winter flounder larvae because of increased sand shrimp predation.

Haas, G. 2002, May 16. MA DEP letter to EPA, Office of Ecosystem Protection Director Linda Murphy (Review of BPS Variance Request).

Keller, A.A., and G. Klein-MacPhee. 2000. Impact of elevated temperature on the growth, survival, and trophic dynamics of winter flounder larvae: A mesocosm study. *Can. J. Fish. Aquat. Sci.* Vol. 57, pp 2382–2392.

17. Comment

PG&E-NEG asserted that EPA misleadingly states that “Mustard (2001) found that ‘essentially 100 percent of the bay’ is impacted by warmer water temperatures from the thermal plume.” The permittee stated that Mustard measured only the water’s surface temperatures and that “his conclusion only referred to ‘essentially 100 percent’ of the surface waters being affected.” The permittee also argues that since Mustard’s work measures water surface temperatures, it does not support EPA’s statement that the thermal plume influences “‘large areas of Mount Hope Bay.’” Furthermore, according to the permittee, when “EPA states that ‘thermistor data. . . showed that the satellite was recording the temperature of approximately the top 6 feet of the water column,’ EPA has misread Mustard’s report . . . [because he] only looked at thermistor data from 0.25 meters below the surface . . . .” The permittee stated that “[t]he reference to 6 ft. was to another study outside Mount Hope Bay and it is unclear whether that study looked at potential thermal stratification from power plant discharges.” Finally, the permittee also stated that while EPA states that “satellite imagery by Jack Mustard ‘shows that the surface water of Mount Hope Bay is on average 1.5 degree F warmer in the summer and fall than comparable shallow parts of Narragansett Bay,’ . . . the comparison was only true for Upper Narragansett Bay, [and] not for any other ‘comparable shallow parts of Narragansett Bay.’”

Response

EPA agrees that Mustard’s report refers to 100 percent of the surface area of the bay and does not mean 100 percent of the volume. However, EPA maintains that the satellite images are a reasonable representation of at least the top 6 feet of the water column. This understanding is based on discussions with Dr. Mustard and the review of past water quality surveys that show fairly uniform water temperatures to depths below 2 meters (ASA, 1996; MRI, 1999). Because these satellite images represent water temperatures down to 6 feet, EPA maintains that the images demonstrate the influence of BPS’s thermal plume over large areas of Mount Hope Bay.

Regarding the comparison of surface water temperatures, Mustard compared water temperatures of comparable shallow waterbodies at the same latitude to account for potential variance in climatic conditions due to changes in latitude. EPA agrees that the comparison was only for Upper Narragansett Bay. During the summer and into the early fall, water temperatures decrease as one progresses south in Narragansett Bay because of the influence of the ocean. A comparison of comparable shallow water farther south in Narragansett Bay with that in Mount Hope Bay would show an even **greater** discrepancy in temperature.

Applied Science Associates, Inc. 1996. *Data Report New England Power Company Brayton Point Station Dissolved Oxygen Assessment Field Studies*. 200 pp.

Marine Research, Inc. 1999. *Brayton Point Station 1998 Annual Report*. 600 pp.

18. Comment

PG&E-NEG stated that EPA's analysis of eelgrass, a habitat former, is speculative and inconsistent with the facts. According to the permittee, EPA "asserts that BPS is somehow responsible for preventing the recovery of eelgrass in Mount Hope Bay." The permittee argued that the data show that eelgrass disappeared not only from Mount Hope Bay but from most of the eastern seaboard in the 1930s and it has not recovered. The permittee also commented that there is no evidence that the thermal discharges it proposes for BPS (i.e., 28 TBtu) would affect the recovery of eelgrass if it were to return. The permittee argued that while EPA "speculates" that poor water quality conditions "would reduce the upper thermal limit of eelgrass," making it more sensitive to the BPS discharge, EPA "ignores the fact that the poor water quality alone has prevented recovery of eelgrass in Mount Hope Bay." The permittee stated that this poor water quality (eutrophication) is unrelated to BPS and supported this statement with a citation to a personal communication with Fred Short, University of New Hampshire (August 2002). The permittee also argued that any effect water temperature might have on eelgrass is immaterial because the poor water quality precludes its recovery anyway.

Response

EPA believes that the thermal discharge from BPS, alone or in combination with poor water clarity, has rendered Mount Hope Bay an unsuitable habitat for eelgrass. The two major physical factors that affect growth and survival in eelgrass are light and water temperature. Laboratory studies have shown that temperature affects photosynthesis and respiration rates in eelgrass (Marsh et al., 1986; Bulthius, 1987). Specifically, increased temperature increases photosynthetic rates and, to a greater extent, respiration rates. Field studies have shown that sustained exposure to temperatures in excess of 25 ºC correlates with eelgrass decline (Thayer et al., 1975; Evans et al., 1986). Burke et al. (1996) demonstrated that reduced light, high nitrogen, and warm water temperatures led to a negative carbon balance (i.e., the accumulation of photosynthetic carbon is exceeded by losses of carbon to respiration). Plants experiencing a negative carbon balance for a sufficient period will wither and die. Bintz et al. (2003) examined the cumulative effect of high nutrients and high temperatures on coastal lagoon communities that included eelgrass. They used mesocosm experiments to expose coastal lagoon communities to combinations of warm and cool water temperatures, high and low nutrients, and combinations of the temperature and nutrient variables. The warm water treatment ranged in water temperature from 13 to 27 ºC over the 4-month experiment. Sustained exposure to this warm water treatment resulted in reduced eelgrass survival, growth, and production as compared to controls. Similar reductions were observed for eelgrass in elevated nitrogen treatments. Significantly greater negative effects occurred in eelgrass in tanks with both elevated nutrient concentrations and elevated water temperature. These two stressors appear to work synergistically in restricting eelgrass growth and survival.

BPS's Enhanced Multi-Mode proposal would result in large quantities of Mount Hope Bay exceeding 25 ºC for extended periods of time during warm summers. This fact alone suggests that the thermal discharge may represent a thermal exclusion zone for eelgrass, one of the RIS identified by the BPS TAC. This potential for thermal exclusion exists even if one does not consider the additional stress of high nutrient levels present in Mount Hope Bay. Elevated nutrient levels have been shown to reduce the temperature at which eelgrass will cease to grow or begin to experience mortality (Bintz et al., 2003; Bulthuis, 1987). The permittee claims that turbidity is the sole factor preventing eelgrass from growing in Mount Hope Bay. EPA agrees that water clarity is certainly an issue that needs to be addressed in Mount Hope Bay. However, turbidity alone has not prevented the growth of eelgrass in other turbid but cooler waterbodies. Both Boston Harbor and Salem Harbor currently support some eelgrass meadows, and have supported them even during the periods of poorest water quality. These populations are restricted to relatively shallow water, likely because poor water clarity prevents adequate light from reaching deeper areas.

In Mount Hope Bay, some combination of reduced water temperatures and improved water clarity will be necessary to reestablish conditions that would support eelgrass growth. Both Rhode Island and Massachusetts have scheduled a comprehensive review of nutrient loading in Mount Hope Bay through a TMDL analysis. This analysis will select a target level of nutrient loading that is protective of the designated uses and aquatic life of Mount Hope Bay and allocate appropriate nutrient loads to each discharger in the watershed. The ultimate result of this effort will be to significantly reduce nutrient concentrations in Mount Hope Bay.

In addition, during the past year close to $1 million has been awarded to Save The Bay and the University of Rhode Island from several different Federal and State funding sources to support efforts to restore eelgrass to various locations in Narragansett Bay. Clearly, concrete efforts are being made to bring this important nursery habitat back to areas that it had previously occupied. The thermal discharge limits in EPA's permit would remove one more obstacle to eelgrass restoration efforts.

Bintz, J.C., S.W. Nixon, B.A. Buckley, and S.A. Granger. 2003. Impacts of temperature and nutrients on coastal lagoon plant communities. *Estuaries.* 23(3), pp 765–776.

Bulthuis, D.A. 1987. Effects of temperature on photosynthesis and growth of seagrasses. *Aquatic Botany.* 27, pp 27–40.

Burke, M.K., W.C. Dennison, and K.A. Moore. 1996. Non-structural carbohydrate reserves of eelgrass *Zostera marina*. *Marine Ecology Progress Series*. 137, pp 195–201.

Evans, A.S., K.L. Webb, and P.A. Penhale. 1986. Photosynthetic temperature acclimation in two coexisting seagrasses *Zostera marina* L. and *Ruppia maritima* L. *Aquatic Botany.* 24, pp 185–197.

Marsh, J.A., W.C. Dennison, and R.A. Alberte. 1986. Effects of temperature on photosynthesis and respiration in eelgrass (*Zostera marina* L.). *Journal of Experimental Marine Biology and Ecology.* 101, pp 257–267.

Thayer, G.W., D.A. Wolfe, and R.B. Williams. 1975. The impact of man on seagrass systems. *American Scientist.* 63, pp 288–296.

19. Comment

PG&E-NEG stated that EPA had three major reasons for rejecting the annual thermal discharge limit of 28 TBtu proposed by the company, and these reasons are unfounded. According to the permittee, EPA rejected the company's proposed limit for the following reasons: first, dramatic swings in finfish abundance evidenced from 1972 to 1984 indicate an unstable population prone to collapse; second, winter flounder abundance in Mount Hope Bay has been declining since 1972; and third, analysis by MRI indicates that certain species of finfish have noticeably declined in abundance in upper Mount Hope Bay during 1972–1978.

a. As to the first reason above, the permittee argued that the view that the fish population swings indicate an unstable population is "entirely speculative and unsupported by science." The permittee stated that EPA's only citation supporting this point was a comment in a cover letter (i.e., Hicks [1996]). The permittee further states that large population swings can occur in healthy populations.

b. The permittee also argued that the second and third reasons above are unsupported. The permittee argued that it has shown based on a review of the historical data that there is "no difference" between the abundance trends in Mount Hope Bay and Narragansett Bay for any species between 1972 and 1984. The permittee further argues that BPS "only affects Mount Hope Bay." Therefore, according to the permittee, there is "no evidence that the decline observed in Mount Hope Bay was caused by BPS." The permittee also stated that there is no evidence that "factors causing an equivalent decline in fisheries in Narragansett Bay (e.g., overfishing, nutrient loadings) are affecting Mt. Hope Bay." (EPA expects that the permittee meant to write the word "not" between "are" and "affecting" in the previous sentence.)

c. The permittee also stated that its analysis shows that "no meaningful biological difference" would result from imposing EPA's thermal discharge limitations instead of those proposed by the permittee. The permittee represented that its consultant DeAlteris "found that abundance trends in the lower 2/3 of the [Mount Hope] Bay have been identical to those in Narragansett Bay." The permittee further represented that its consultant LMS "found that the temperatures in the upper Bay under EMM would generally be very similar to those that now exist in the lower Bay" and that "the difference that would exist would be biologically insignificant."

Response

EPA rejected the permittee's proposed 28 TBtu limit because the Agency found, after prolonged and thorough analysis, that the limit would not assure the protection and propagation of the balanced, indigenous community of shellfish, fish, and wildlife in and on Mount Hope Bay, as is required by CWA § 316(a). Part of EPA's determination rested on evidence regarding trends in finfish abundance in Mount Hope Bay. Other factors also played a role in EPA's decision, such as the large extent of thermal exclusion zones for fish and eelgrass in the bay and the increased prevalence of heat-tolerant species that would result from the thermal discharge limits proposed by the permittee.

EPA has discussed evidence regarding BPS's contribution to the biological decline in Mount Hope Bay and the competing interpretations of abundance trends in Mount Hope Bay and Narragansett Bay in Chapter 6 of the July 22, 2002, Permit Determinations Document and elsewhere in this document. The Agency briefly addresses several of the specific points raised by this comment below.

To address the permittee's first point regarding the stability of the finfish population, EPA acknowledges that wide swings in abundance by themselves may not be indicative of a collapsing population. They do, however, represent a population at greater risk of collapsing. Ricklefs (1990) states that the probability of extinction increases as a population declines. Thus, a population that bounces between very low and high levels of abundance reflects some instability and would be at greater risk of extinction than a population that persists at some intermediate level of abundance. In addition, since winter flounder exhibit a high degree of site fidelity to their spawning sites, recruitment of individuals from neighboring populations, in times of low population abundance, may be limited. Thus, EPA believes in this specific situation that widely fluctuating winter flounder abundance from 1972–1984 does suggest an unstable population more at risk of a collapse, which it ultimately did.

PG&E-NEG has suggested that the 28 TBtu/year discharge associated with its Enhanced Multi-Mode proposal would be sufficient to protect fish stocks in Mount Hope Bay because this level of heat would be similar to the level discharged prior to the collapse of fish stocks in the mid-1980s, suggesting that this restriction should be sufficient to restore the balanced, indigenous community in Mount Hope Bay. Implicit in this suggestion, however, is a belief that fish populations prior to the collapse were stable, healthy communities.

However, EPA believes that fish populations were already beginning to decline in the 1970s, prior to the collapse in the mid-1980s. This opinion was supported not only by Hicks (1996) but also by most members of the TAC (See Agency Comment Letters in Appendix B of EPA's July 22, 2002, Permit Determinations Document). Therefore, the Agency does not believe that simply lowering the level of thermal discharge to match that of the company's pre-1985 operations would be an effective or scientifically sound way to assure the protection and propagation of Mount Hope Bay's fish populations. Indeed, past experiences in fisheries management have demonstrated that a fish stock's path to recovery is often not the same as its path of decline. To trigger recovery of a fish stock, fishery managers frequently must reduce mortality on a stock well below what they believe to be long-term, sustainable levels based on fisheries models.

EPA carefully examined the thermal impacts and entrainment and impingement losses associated with the permittee's Enhanced Multi-Mode proposal. The substantial differences between the thermal and biological impacts of PG&E-NEG's proposed permit limits and EPA's proposed permit limits are discussed in detail elsewhere in this document.

Ricklefs, R.E. 1990. *Ecology*. W.H. Freeman and Co., New York.

20. Comment

PG&E-NEG stated that it used "state of the art analytical techniques" to provide a "comprehensive picture" of the effects of thermal discharges on 18 species of fish. According to the permittee, its analysis "demonstrated that a thermal discharge of 28 TBtu [per year] would have negligible effects on the fish." The permittee complained that EPA rejected its evaluation in favor of an assessment of the effects of thermal discharges on fish based on "absolute temperature thresholds," and stated that EPA's approach was "simplistic," as well as "biologically arbitrary and conceptually flawed in critical respects." The permittee further complained that EPA did not explain why it uses its "clearly inferior method" instead of relying on the permittee's allegedly "state of the art" analysis. The permittee also stated that EPA's method cannot be used to determine if 28 TBtu would cause "appreciable harm" to the fishery.

Response

EPA disagrees that PG&E-NEG's analyses provided a comprehensive, accurate picture of the effects of thermal discharges on fish in Mount Hope Bay. Having considered these analyses in detail, EPA concluded that they did not provide meaningful, realistic predictions of biological impacts. EPA has explained its rationale for rejecting PG&E-NEG's analytical approach elsewhere in this document and in Chapter 6 of EPA's July 22, 2002, Permit Determinations Document. However, the Agency wishes to note a few points here.

It is important to note that any model or analysis is only as good as its ability to replicate what is actually occurring in the real world. Unfortunately, while the computer models and analyses used by PG&E-NEG may be sophisticated, they have failed to reflect actual data from Mount Hope Bay. For instance, the RAMAS model that the permittee used to predict winter flounder abundance was not able to replicate known changes in abundance that occurred in the 1970s and predicted a recovery of fish in Mount Hope Bay in the 1990s that never happened. Similarly, PG&E-NEG now claims there are 300,000 winter flounder currently residing in the bay, yet actual field data show that less than one winter flounder is caught per tow in the majority of the bay. As EPA has explained elsewhere in this document, if there were actually 300,000 winter flounder in the bay, one would expect the trawl survey to catch tens of winter flounder per tow. As a final example, PG&E-NEG's thermal analysis suggests that there is little thermal impact from BPS's current thermal discharge, but these results contrast with the signs of thermal stress now found in Mount Hope Bay: winter flounder are currently found to be avoiding the warm, shallow water areas of Mount Hope Bay; nuisance algal species and other types of more thermally tolerant species have been detected in the bay; and normal fish migration patterns have been disrupted. The Agency also notes that it has clearly not been opposed to the use of sophisticated computer models where they have been shown to reasonably reflect reality. EPA and the other agencies worked long and hard with the permittee and its consultants on the development of a hydrothermal model to depict thermal discharge plumes under different operating conditions. Once the model was properly "ground-truthed" with field data, EPA agreed to use the results from the model.

EPA has explained its approach to assessing thermal impacts elsewhere in this document. The approaches used by EPA and PG&E-NEG are basically similar, but diverge in two key aspects. First, EPA does not agree with PG&E-NEG's application of acclimation temperatures. Second, EPA and PG&E-NEG disagree on the biological responses to certain temperatures as cited in the scientific literature. EPA has explained its findings regarding the application of acclimation temperatures and temperature thresholds for biological responses elsewhere in this document and in Chapter 6 of EPA's July 22, 2002, Permit Determinations Document. EPA notes here that its conclusions regarding these factors, which it believes are based on reliable data and credible scientific reasoning, produce significantly different (and, EPA believes, more reasonable and accurate) results than the interpretations chosen by PG&E-NEG.

Despite PG&E-NEG's criticism of EPA's analytical methods, the Agency believe that its methods most reasonably and accurately reflect the actual effects of thermal discharges in Mount Hope Bay. EPA considered a number of analytical approaches and chose those that best fit the available field data and sound scientific principles. In doing so, EPA chose the approach that could best determine what stressor(s) could have been significant enough to reduce fish abundance by 88 percent over a short period of time and a large area of the bay, and to cause this decline to continue for close to 20 years. EPA's analysis objectively looked at the impact of BPS operations not only on fish but on each distinct level of the aquatic community within Mount Hope Bay. EPA has also considered other stressors and acknowledged that overfishing and global warming are also likely to be playing a role in shaping the current biological community in Mount Hope Bay. Although PG&E-NEG may find EPA's analysis "simplistic," the Agency believes its analysis is reasonable and appropriate and provides a better match with the actual field data than the analysis offered by the permittee. Consistent with sound science, EPA has chosen to use the approach that more reasonably and accurately predicts the effects of thermal discharges and thus helps it to set permit limits that will meet the statutory test of assuring the protection and propagation of the BIP in Mount Hope Bay. Finally, EPA notes that recent data, such as the satellite images of the thermal plume, has revealed that prior "state of the art" analyses conducted by BPS for prior permits also underpredicted the environmental effects of plant operation.

21. Comment

PG&E-NEG stated that EPA wrongly questions the use of acclimation temperatures in setting thermal discharge permit limits. The permittee commented that using acclimation temperatures as suggested by the permittee is widely accepted by scientists, including scientists "contracted with EPA." The permittee stated that there is a wide range of temperatures at which there is some observable effect up to the point of mortality, and that small changes in temperature between the no effect level and the mortality level may have some effect, but that effect will be "proportionally smaller or negligible." According to the permittee, biologists "uniformly reject" the critical temperature approach taken by EPA under which an absolute temperature threshold is set which assumes that no harm will occur below that temperature and significant harm will necessarily occur immediately upon reaching that temperature. The permittee stated that EPA consultants Coutant and Bevelhimer have rejected this approach, as have the MA DEP and Mark Gibson of RI DEM. The permittee complains that EPA's approach is inconsistent with reality and fails to take the "actual biological impact of heat" into account, and that EPA set its temperature thresholds and considers only whether they are exceeded or not, deeming it irrelevant whether they are exceeded by a lot or a little. According to the permittee, EPA treats even a small exceedance as critical, although "all biologists" would agree that a little exceedance would be unimportant.

Response

While EPA acknowledges that there may be competing viewpoints on how and when to apply acclimation temperatures in assessing thermal impacts, the Agency believes that it has appropriately rejected their use by the permittee in this case. The appropriate application of temperature acclimation depends on the circumstances of a particular biological community. EPA recognizes that many organisms have the capacity to survive higher than normal temperatures when first acclimated to lower temperatures. Numerous laboratory studies have demonstrated that this is physiologically possible. However, a number of other studies have demonstrated that behavioral changes can occur at substantially lower temperatures than the maximum temperature at which survival is seen in a laboratory study. For instance, a fish in a laboratory may survive at such high temperatures, but fish in the wild are likely to leave the area, thereby depleting the balanced, indigenous community. It bears emphasis here that the CWA requires EPA to assure the protection and propagation of the balanced, indigenous community of shellfish, fish, and wildlife in and on Mount Hope Bay, not that it simply assure the survival of some individual fish.

EPA is not convinced that the approach taken by PG&E-NEG to account for acclimation reflects biological reality. EPA's specific concerns are detailed in Chapter 6 of the July 22, 2002, Permit Determinations Document and elsewhere in this document. The distribution of fish in Mount Hope Bay itself may be the most compelling argument against PG&E-NEG's position that fish will stay in one location and acclimate to a higher temperature rather than seek out a more optimal temperature regime. In fixed trawl studies, significantly greater numbers of fish are caught in the deep (>20 feet) stations, where water temperatures are cooler, than in the shallow (<20 feet) stations. For a thermally sensitive species like winter flounder, approximately 80 percent of the catch is from deep stations. This is particularly telling, considering that the fishing effort in the shallow stations is five times greater than the fishing effort in deep water. Winter flounder in nearby upper Narragansett Bay show a preference for shallow water with 60 percent of the catch coming from depths of less than 20 feet (Lynch, personal communication).

EPA considered a variety of approaches and data before deciding that the use of threshold temperatures (as opposed to acclimation temperature) was appropriate. EPA considered PG&E-NEG's temperature polygon approach, the discrepancy between responses to elevated temperatures found in laboratory studies and field studies, changes in species interactions associated with elevated temperatures (i.e., increased sand shrimp predation on winter flounder eggs with temperature), the actual distribution of fish in Mount Hope Bay, and the dire condition of fish stocks and aquatic life in the bay. Based on all this information, EPA determined that its use of temperature thresholds was necessary and appropriate to reasonably assure the protection and propagation of the BIP in Mount Hope Bay.

Finally, the permittee overstates or misinterprets the position of other biologists regarding temperature acclimation. Mark Gibson of RI DEM, Gerry Szal of MA DEP, and Todd Callaghan of MA CZM all submitted comments to EPA on PG&E-NEG's variance application criticizing PG&E-NEG's approach to temperature acclimation. Charles Coutant and Mark Bevelhimer are proponents of using acclimation temperature when it is feasible and makes biological sense (e.g., in predicting lethal effects of entrained organisms exposed to elevated temperatures), but have not rejected other reasonable approaches to predicting thermal impacts.

Lynch, T., Rhode Island DEM, personal communication, September 5, 2003.

22. Comment

PG&E-NEG complained that EPA contends that using MRI field survey data to delineate habitat for RIS underestimates actual habitat utilization because as fish populations have declined, they use less habitat. The permittee stated that, contrary to EPA's assertions, it did not use the MRI survey data to develop the habitat delineations it applied in its CWA § 316(a) Demonstration. The permittee also stated that whenever it delineated RIS habitat as only a portion of Mount Hope Bay, the portion selected was in "the upper 1/3 of the bay," and if the habitat area "was changed to a 'whole bay' definition, the predicted biothermal effects would be slightly *lower*. . . ."

Response

When the permittee developed habitat maps for Mount Hope Bay for some of the RIS, EPA assumed that actual field data (i.e., the MRI survey data) regarding where fish had been caught, would be used to derive these habitat maps. However, according to the permittee, actual field data were not used to groundtruth the habitat delineations. Therefore, EPA is still not convinced that the delineations are accurate. Finally, EPA disagrees that including the whole bay in the definition of habitat area would decrease the predicted biothermal effects. The actual number of acres of habitat affected by the thermal plume would likely increase as well.

23. Comment

PG&E-NEG stated that EPA criticized its analysis for failing to separate the juvenile and adult life stages in the company's "temperature polygons." The permittee responded to this point by stating that the information in the scientific literature is not sufficient to do this. According to the permittee, "[t]he only biometric for which sufficient data exists to analyze juvenile and adult life stages separately is avoidance . . . [and t]he four species for which such data exists are alewife, Atlantic menhaden, bay anchovy, and white perch." The permittee stated that "separate evaluations of individual adult and juvenile predicted avoidance for these species showed little to no change in what was already presented." The permittee further stated that "almost all of the data presented in the polygon [for winter flounder] were for the juvenile life stage . . ." and that this was a conservative analysis since "the critical period and life stage for winter flounder are the summer period and juveniles, respectively. . . ."

Response

EPA disagrees that available data are insufficient to allow for a separate analysis of juvenile and adult life stages. EPA's review of the literature found numerous studies providing data on juveniles and adults for a number of the RIS. For winter flounder specifically, existing studies address temperatures for optimal egg hatching and larval survival and development, as well as juvenile and adult preferences (Keller and Klein-MacPhee, 2000; Rogers, 1976; Buckley et al., 1990; Williams, 1975; Laurence, 1975). It is unclear why PG&E-NEG did not consider these studies. The avoidance temperature for adult winter flounder is several degrees lower than that for juveniles (Coutant and Bevelhimer, 2001); thus, EPA would expect to see a substantial difference if the analysis was run for adults. Finally, EPA disagrees with the permittee's assertion that its analysis is conservative for the following reasons:

1. The hydrothermal model used to predict water temperature did not account for future increases in water temperature due to global warming.
2. Keller and Klein-MacPhee (2000) show that small changes in winter water temperature can result in dramatically different survival rates for eggs and larval winter flounder. In addition, Collie and DeLong (2002) detected a mortality bottleneck from the egg to larval life stages for winter flounder in Mount Hope Bay. The results of these studies suggest that the egg and larval life

stages are also critical periods. Yet, the PG&E-NEG assessment ignored the effect of temperature on these life stages.

Buckley, L.J., A.S. Smigielski, T.A. Halavik, and G.C. Laurence. 1990. Effects of water temperature on size and biochemical composition of winter flounder *Pseudopleuronectes americanus* at hatching and feeding initiation. *Fishery Bulletin*. 88, pp 419–428.

Collie, J.S., and A.K. DeLong.2002. *Examining the decline of Narragansett Bay winter flounder*, Final Report to RI DEM Division of Fish and Wildlife. 150 pp.

Keller, A.A., and G. Klein-MacPhee. 2000. Impact of elevated temperature on the growth, survival, and trophic dynamics of winter flounder larvae: a mesocosm study. *Can. J. Fish. Aquat. Sci.* 57, pp 2382–2392.

Laurence, G.C. 1975. Laboratory growth and metabolism of the winter flounder *Pseudopleuronectes americanus* from hatching through metamorphosis at three temperatures. *Marine Biology*. 32, pp 223–229.

Rogers, C.A. 1976. Effects of temperature and salinity on the survival of winter flounder embryos. *Fishery Bulletin*. 74(1), pp 52–58.

Williams, G.C. 1975. Viable embryogenesis of the winter flounder *Pseudopleuronectes americanus* from -1.8^{o} C to 15^{o} C. *Marine Biology*. 33, pp 71–74.

24. Comment
According to PG&E-NEG, the basis for EPA's concern about the company's use of acclimation temperatures was the "7 days in grid cell assumption." The permittee stated that its assumptions for "grid-cell sizes and duration of residence within those cells appear to be very reasonable" for winter flounder. The permittee further stated that it asked its consultant LMS to address EPA's concern by doing another analysis assuming acclimation in the whole bay rather than in just one grid cell, and that LMS found that the results were "basically the same."

Response
The permittee's use of the "7 days in grid cell assumption" was **one** of EPA's concerns regarding the use of acclimation temperatures. For a discussion of EPA's other concerns, see responses elsewhere in this document. The "7 days in grid cell assumption" assumes that fish reside in a particular grid cell of the hydrothermal model for 7 days to acclimate to higher temperatures. EPA's comment regarding the use of the 7-day assumption was a general rather than species-specific comment. Fish will tend to acclimate to their optimal temperature if they have free choice of location and a full temperature range available (Coutant, 1972). Thus, it is an unreasonable assumption to expect a mobile pelagic fish or even an adult demersal fish to reside for 7 days in a grid at a temperature that exceeds their optimal, when they have the option to seek out more preferential temperatures. EPA acknowledges that this may be a valid assumption for juvenile winter flounder because of the limited mobility of the juveniles and the size of the grids in question.

Coutant, C.C. 1972. Biological aspects of thermal pollution II. scientific basis for water temperature standards at power plants. *CRC Critical Reviews in Environmental Control*. 3(1), pp 1–24.

25. Comment
PG&E-NEG stated that EPA concluded that the company's use of "acclimation temperatures" to derive predicted "optimal temperatures" was inappropriate for the following four reasons: (1) the concept of acclimation temperatures is "uncertain and debatable"; (2) RI DEM data show that winter flounder

abundance decreases rapidly at 24 ºC; (3) Duffy and Luders (1978) and Casterlin and Reynolds (1982) found that juvenile winter flounder show avoidance at 24 ºC; and (4) Olla et al. (1969) found that winter flounder burrow into bottom sediments at temperatures greater than 22.2 ºC. The permittee asserted that the studies EPA cited do not support the Agency's position.

- According to the permittee, field studies are of questionable value for measuring avoidance because nonthermal factors may also be influencing matters.
- The permittee also stated that RI DEM is incorrect that winter flounder are absent from waters over 24 ºC, and that neither Duffy and Luders (1978) nor Casterlin and Reynolds (1982) suggest that juvenile winter flounder avoid water temperatures greater than 24 ºC.
- The permittee also argued that it is "not credible" to suggest that behavioral responses in fish would begin at 22.9 ºC. According to the permittee, McCracken (1963) states that this is "characteristic of 'disturbed' winter flounders, including those exposed to light." The permittee suggested, therefore, that the observation by divers of burrowing flounder reported in Olla (1969) "could easily be explained by a recent disturbance (which could have been the divers themselves) or by an increase of light exposure."

Response

EPA concludes that using the permittee's application of acclimation temperatures would have been inappropriate to predict the biological effects of thermal discharges in Mount Hope Bay. The Agency also concludes that the studies to which the permittee refers do, in fact, support EPA's conclusions. For a discussion of the application of acclimation temperatures in this case, see the Agency's responses elsewhere in this document.

EPA agrees that it is not possible to control all variables in a field study, although it does not agree that this makes field studies "of questionable value" in determining the ecological effects of thermal discharges. Certainly, the inability to control for all variables may make it more difficult to establish a cause-and-effect relationship between a temperature change and a biological effect. Laboratory studies better situate a researcher to try to control all variables, and thus the researcher may be able to establish a cause-and-effect relationship with more certainty. It is important to note, however, that laboratory studies often may not measure endpoints that are ecologically meaningful. For instance, designing a laboratory study that would meaningfully measure thermal avoidance is difficult, since most such studies would be performed in tanks and thus would not allow for true avoidance. In addition, placing animals in artificial enclosures creates an abnormal amount of stress on many species. Therefore, the investigator may be adding another variable by simply enclosing the animal before the experiment begins. The debate over the value of laboratory versus field studies is pervasive throughout science and it is not one that is going to be settled through this permit process. Recognizing that each approach has strengths and weaknesses, EPA considered information from both laboratory and field studies in assessing the likely response of fish populations to thermal discharges from BPS.

The permittee also disputes EPA's suggestion that biological effects on winter flounder occur at 22.9 ºC. EPA actually did not suggest that biological effects begin at 22.9 ºC, but at 22.2 ºC. EPA's conclusion was based in part on a paper by Olla et al. (1969), which the permittee originally submitted to EPA but now disputes. EPA maintains that the paper's findings are valid. Olla et al. (1969) found that winter flounder burrowed into the sediments, where it is cooler, in response to elevated water temperature (22.2 ºC). During the period in which winter flounder exhibit this burrowing behavior, they stop feeding. In addition, Grace Klein-MacPhee, a winter flounder expert at the University of Rhode Island, stated that sublethal effects begin at 20 ºC (MA DEP, 2002).

PG&E-NEG suggests that the burrowing behavior observed by Olla et al. (1969) was actually caused by changes in light intensity and the presence of the divers collecting data for the study. However, there is no indication that significant changes in light intensity occurred during the course of the Olla et al. (1969) study. Moreover, EPA has little reason to believe that divers caused the burrowing behavior. EPA biologists (Phil Colarusso, Eric Nelson), who have a combined number of north Atlantic dives close to 500, have observed winter flounder on many of their dives. When approached by a diver, winter flounder will typically remain stationary and rely on camouflage to hide it. A diver can easily approach a winter flounder and get within 2 to 3 feet without triggering a response. Furthermore, the winter flounder's response to disturbance by divers is first to swim away and then they may burrow into the sediments to avoid future detection. It has not been the Agency's experience that winter flounder burrow in place in response to divers, which was the behavior recorded by Olla et al. (1969).

EPA disagrees with the permittee on the characterization of the Duffy and Luders (1978) and Casterlin and Reynolds (1982) papers and maintains that these papers support an avoidance temperature of 24 ºC for juvenile winter flounder. In addition, Duffy and Luders considered data specifically from Mount Hope Bay.

Casterlin, M.A., and W.W. Reynolds. 1982. Thermoregulatory behavior and diel activity of yearling winter flounder, *Pseudopleuronectes americanus* (Walbaum). *Env. Biol. Fish*. 7, pp 177–180.

Olla, B.L., R. Wicklund, and S. Wilk. 1969. Behavior of winter flounder in a natural environment. *Trans. Amer. Fish. Soc.* 4, pp 717–720.

26. Comment
PG&E-NEG stated that EPA contends that the company's assumption of acclimation and the use of a 7-day acclimation period result in an underestimate of chronic mortality to juvenile winter flounder from thermal discharges. The permittee stated that EPA is incorrect to conclude that the "acclimation concept" results in an underestimate of chronic mortality. According to the permittee, "the thermal thresholds assessed in the Final Demonstration are exactly those referenced in the Bevelhimer and Coutant (2002) report prepared for EPA , which cites an acclimation temperature with respect to each of the five thermal threshold values shown." The permittee stated that this "suggests that the chronic mortality results are correct."

Response
Upon further review, EPA agrees that the chronic mortality results do represent a reasonable estimate for juvenile winter flounder. This is because use of the 7-day acclimation period may be appropriate here based on the limited mobility of juvenile winter flounder.

27. Comment
PG&E-NEG stated that EPA failed to acknowledge or address the fact that the outputs from the ASA model that predicted 5 days of temperature exceedance "were not 5 consecutive days." The permittee stated that this is of "critical importance" in assessing the biological impact of thermal discharges on fish because elevated temperatures over long, sustained periods would have different effects than intermittent temperature increases for short periods of time. The permittee complained that EPA is being arbitrary by measuring compliance with temperature thresholds based on whether they are exceeded in 5 or more days per month. According to the permittee, EPA's approach ignores the biological significance of whether there were 6 days or 26 days of exceedance, and effectively concludes that the difference between 4 and 5 days of exceedance is critical, but the difference between 6 and 26 days is not.

Response

EPA selected a temperature exceedance frequency of > 5 days as a measure of compliance because its analyses indicated that this was the maximum frequency that would allow for protection and propagation of the BIP in Mount Hope Bay. EPA's rationale for selecting a frequency of temperature exceedance of > 5 days is discussed in greater detail elsewhere in this document. PG&E-NEG's hydrothermal model predicted areas of the bay that would exceed a specific target temperature for > 5 days based on a variety of different thermal loading scenarios. EPA acknowledges that the model exceedances may not have always represented 5 consecutive days, but also recognizes that in many cases it likely represented a total quantity of time far **greater** than 5 days. The predicted daily average temperature was compared to a specific threshold temperature to determine an exceedance. A time period equivalent to a day was used because the complexity of the model made the time and expense of running the model at intervals less than a day prohibitive. This approach to temperature thresholds and biological effects is therefore not as conservative as it could have been. A daily average temperature of 25 ºC for instance, certainly potentially reflects hours of the day when water temperatures could substantially exceed 25 ºC. EPA's approach certainly does not reflect the "no effects" level that several commenters feel is warranted in light of the condition of fish populations in Mount Hope Bay. However, EPA believes that this is a reasonably protective approach that, when implemented along with continued fisheries management and water pollution control, will lead to a revitalized Mount Hope Bay ecosystem.

28. Comment

PG&E-NEG stated that EPA offers no biological justification for the 10 percent areal compliance cutoff it uses for applying its absolute temperature thresholds. The permittee commented that the 10 percent areal cutoff is meaningless "because it focuses only on the change in the area affected relative to one discrete target temperature," but does not quantify the biological consequences of the change. As a result, according to the permittee, there is no explanation of whether or not exceedance of the 10 percent cutoff translates into "a consequential biological effect." The permittee stated that its consultant LMS has concluded that it would have no biological consequence. In addition, the permittee argued that EPA's approach is misleading because large changes in the results would occur if one used modeling runs based on conditions other than the worst case conditions of 1999, or if one changed the critical temperatures by 1 degree. The permittee argued that these "flaws" render EPA's approach "unacceptable" for assessing whether the standards of CWA § 316(a) will be met.

Response

EPA based its areal impact limit on the maximum area of impact it believed would allow for the protection and propagation of the BIP in Mount Hope Bay. In assessing the biological consequences associated with the impact area, EPA considered the general advice from its 1977 draft § 316(a) Guidance Document. The Draft Guidance advocates avoiding thermal impacts on spawning and nursery habitat and generally minimizing the areal extent of thermal impacts to the extent possible. The biological benefits of avoiding thermal impacts on spawning and nursery habitat in Mount Hope Bay are substantial but difficult to quantify, given that the locations of these areas in the bay have not been precisely identified or quantified. Likewise, it is not possible to quantify the exact level of impact on eggs because the number of eggs produced and their exact location in the bay are not known. Nevertheless, it is clear to EPA that minimizing thermal impacts on spawning and nursery habitat in Mount Hope Bay is crucial to assuring the protection and propagation of the BIP.

In light of the above-mentioned data gaps, EPA used the best information available to determine the maximum acceptable area of thermal impact. Published studies regarding spawning area preferences identify a preference for certain habitat characteristics. For example, inshore stocks of winter flounder have been reported to spawn in the estuarine portions of rivers. Based on this general guidance and the location of winter flounder nursery areas identified by the MRI winter flounder young-of-the-year beach seine survey, EPA believes that an impact of 10 percent during the "warm" summer will be sufficiently protective of winter flounder spawning and development. A thermal plume from BPS that meets EPA's proposed permit limits would have minimal overlap with winter flounder nursery habitat identified by MRI (1999) in the lower Taunton, Cole, and Kickamuit Rivers. EPA determined that it would not be possible to significantly minimize impacts on winter flounder spawning habitat in the Lee River without a virtual elimination of the thermal discharge because of the proximity of the discharge canal to that river. However, by focusing on preserving winter flounder nursery habitat in the lower Cole, Kickamuit, and Taunton Rivers, EPA found that allowing a thermal impact of 10 percent of the bay, or 1.4 square miles, would spare the majority of those habitat areas. EPA concluded that although this level of protection would not eliminate all adverse effects from BPS thermal discharges, it should be sufficient to reasonably assure the protection and propagation of the BIP in and on Mount Hope Bay. The Agency could not reasonably reach that conclusion with significantly less stringent limits.

Unfortunately, precise quantification of the level of improvement in fish spawning success and juvenile fish survival from reducing the area of thermal impact to 10 percent of the bay is not possible. The permittee implies that the lack of precise quantification is equivalent to "no consequential biological difference." EPA disagrees with this position as its permit limits represent substantial thermal discharge and impact reductions. Hydrothermal modeling predicts that the majority of areas known as winter flounder nursery habitat will be spared the influence of the thermal plume. In addition, winter flounder are known to spawn in the lower portions of river systems and EPA's Draft Permit minimizes the thermal impact on these areas as well. EPA contends that protection of these critical habitats is essential to help propel the restoration of multiple fish species in Mount Hope Bay. Moreover, the area of thermally induced winter flounder avoidance as a result of the plant's thermal discharge will also be greatly reduced, thus further helping to reasonably assure the protection and propagation of the BIP in Mount Hope Bay.

Marine Research Inc. 1999. *Brayton Point Station 1998 annual report*. 600 pp.

29. Comment

PG&E-NEG stated that the temperature thresholds used by EPA are "unnecessarily low." According to the permittee, EPA has used "highly conservative temperatures based on the lowest level of observed effects in the most sensitive species." The permittee stated that this approach is "inconsistent" with the suggestion in EPA's 1977 Draft CWA § 316(a) Guidance (p. 71) that limits should be set "only" so that temperatures will not exceed the upper limits for survival, growth, and reproduction of any representative important species. The permittee further argued that there is "no convincing evidence" that winter flounder will avoid temperatures greater than 24 ºC. According to the permittee, there is also "no convincing evidence" that striped bass will avoid water temperatures warmer than 25 ºC.

Response

EPA disagrees with the permittee's assertion that its temperature thresholds are unnecessarily low. Based on the severely degraded condition of fish stocks and aquatic life in Mount Hope Bay, significant improvements need to be instituted to allow for the recovery of the balanced, indigenous community of fish, shellfish, and wildlife. EPA has gathered facts, observations and data regarding the ecological community in Mount Hope Bay. Based on its analysis, EPA has constructed a rational, scientifically sound explanation for the adverse impacts that have occurred within the bay, including significant adverse impacts from thermal discharges. For a more detailed discussion of these ongoing impacts, see Chapter 6 of EPA's July 22, 2002, Permit Determinations Document and its responses regarding § 316(a) elsewhere in this document. EPA has considered the scientific literature in selecting thermal discharge limits and the resulting threshold water temperatures. The selected water temperature values are intended to be protective of the RIS, as required by CWA § 316(a), but they certainly do not represent "no impact" values.

EPA has set these limits in a manner consistent with EPA's 1977 Draft § 316(a) Guidance Document. The permittee misinterprets the intent of EPA's 316(a) Guidance Document when it states that the Guidance Document indicates that "when evaluating an applicant's demonstration, EPA is to ensure only that temperatures not be in excess of the upper temperature limits for survival, growth, and reproduction, as applicable, of any RIS occurring in the receiving water." Though the permittee suggests that this should be the target level of protection, the Guidance Document clearly intends it to be a bare minimum. For example, the Guidance Document specifies that thermal discharges to spawning grounds and nursery areas should be avoided. The Guidance Document also states that a 316(a) variance shall be deemed successful only if the EPA Regional Administrator finds that "there is no convincing evidence that there will be damage to the balanced indigenous community or community components, resulting in such phenomena as those identified in the definition of appreciable harm." For a more detailed discussion of the Guidance Document and the concept of "appreciable harm," see responses elsewhere in the § 316(a) section of this document.

EPA also disagrees that there is a lack of convincing evidence that winter flounder and striped bass will avoid areas with temperatures above 24 ºC and 25 ºC, respectively. EPA's conclusion regarding avoidance temperatures for these species was based on a number of studies in the scientific literature, as well as consultation with Dr. Grace Klein-MacPhee, a recognized expert on winter flounder. The avoidance temperature for striped bass was selected based on a review of the scientific literature and has been confirmed as scientifically valid by Dr. Charles Coutant, a recognized expert on thermal effects on fish and striped bass in particular. EPA has discussed this evidence in detail elsewhere in this document and in its 316(a) and (b) Permit Determinations Document. EPA believes that the temperatures chosen represent the level of control needed to assure the protection and propagation of the BIP in Mount Hope Bay.

30. Comment
PG&E-NEG stated that EPA criticizes the company's choice of optimal temperatures for tautog and hogchoker and stated that "'hogchoker avoid water temperatures above 25 degrees C." The permittee complained, however, that EPA "provides no evidence that a different choice would have an appreciable effect on the analysis." According to the permittee, it conducted an analysis using "the lowest temperature having literature support (26.9 degrees C) and found that the percentage of the Bay for which avoidance was predicted was still only 0.2 percent." The permittee further stated that there is "no support" for hogchoker avoidance at 25 ºC and that studies indicate that "hogchoker, when acclimated to 24 ºC, prefer temperatures up to and including 28 degrees C" (emphasis in original).

Response
EPA disagrees with the permittee's assertions regarding avoidance temperatures and optimal temperatures. PG&E-NEG cited two specific studies (Olla and Studholme, 1975, Peters and Boyd, 1972) to support their selection of "optimal" temperatures for tautog and hogchoker. The word "optimal" implies that these values represent the best temperatures for growth and/or survival. However, the authors of these studies never described any of the temperatures from their studies as "optimal." In fact, the temperatures chosen by PG&E-NEG actually represent values that trigger biological impacts. See EPA's July 22, 2002, Permit Determinations Document, pp. 6-32 and 6-33. Peters and Boyd (1972), a study cited by PG&E-NEG, stated that observations in nature indicate that hogchoker avoid temperatures above 25 ºC. Peters and Boyd (1972) thus support the point EPA has made elsewhere in this document, that an organism's response to elevated temperatures in nature often contrasts with responses found in the kinds of laboratory studies relied on by the permittee.

PG&E-NEG also claims that there is "no appreciable effect on the analysis" even if they accept the 25 ºC avoidance temperature for hogchoker. EPA disagrees with this statement. The permittee chose 26.9 ºC as its avoidance temperature for hogchoker, and the hydrothermal model predicted that only a small percentage of the bay's bottom waters (the 3 feet closest to the bottom) would exceed that value in the summer under the current thermal discharge. Hydrothermal modeling results predicted virtually no areas of the bottom waters exceeding 26.7 ºC under the permittee's Enhanced Multi-Mode proposal. EPA also requested hydrothermal modeling results for the bottom waters that exceeded 24 ºC. Under the Enhanced Multi-Mode option, 80 percent of the bay exceeded this temperature value for at least 1 day. Thus, a small change in temperature can lead to a very large change in the level of biological effect.

Unfortunately, no model run was completed for 25 ºC in the bottom waters, but 25 ºC model runs were conducted for the surface (top 3 feet of the water column) and the midwater (the water column minus the top 3 and bottom 3 feet). For the Enhanced Multi-Mode option 34 percent of the bay exceeded 25 ºC in the midwater and 70 percent of the surface water (PG&E-NEG, 2001). At lower heat loads, the area exceeding this temperature was significantly reduced (PG&E-NEG, 2001). From these results it can be inferred that some substantial portion of the bottom waters of Mount Hope Bay would be 25 ºC. The affected areas would be closest to the point of discharge, which is near the lower portions of the freshwater rivers that enter the bay. Hogchoker is a demersal fish that is truly estuarine, favoring the lower salinities found in the lower parts of these rivers (Collette and Klein-MacPhee, 2002). Having established that hogchoker will avoid temperatures above 25 ºC, and that its preferred habitat areas are likely to be significantly affected by thermal discharges, EPA believes that there is indeed a substantive difference resulting from the selection of 25° C as an avoidance temperature as opposed to the company's selection of 26.9 ºC.

Collette, B.B., and G. Klein-MacPhee, eds. 2002. *Bigelow and Schroeder's fishes of the Gulf of Maine*. 3rd Ed., Smithsonian Institution Press, Washington.

Olla, B.L., and A.L. Studholme. 1975. The effect of temperature on the behavior of young tautog, *Tautoga onitis*.(L.). In *Proceedings of the 9th European Marine Biology Symposium*, pp 75–93. Aberdeen University Press.

Peters, D.S., and M.T. Boyd. 1972. The effect of temperature, salinity, and availability of food on the feeding and growth of the hogchoker, *Trinectes maculatus* (Block & Schneider). *J. Exp. Mar. Bio. Ecol.* 9, pp 201–207.

PG&E-NEG. 2001. Section 308 Information Request Response, August 10, 2001. 92 pp.

31. Comment

PG&E-NEG stated that EPA's proposed permit limits for thermal discharges must be too stringent because even without the plant operating, ambient water temperatures would still "routinely" exceed EPA's thresholds. The permittee also complained that EPA's approach incorrectly suggests that water temperatures below the threshold are "benign" while temperatures above the threshold would require plant shutdown.

Response

EPA disagrees that its thermal discharge limits are too strict simply because ambient water temperatures would sometimes exceed the cutoff values. EPA selected the threshold temperatures by reviewing the scientific literature regarding what temperatures would be supportive of critical life processes of the RIS of Mount Hope Bay. EPA assessed the biological effects of thermal discharges based on these values from the literature. The Agency assumes that PG&E-NEG's comment specifically refers to its selection of 5 ºC for a winter water temperature protective of winter flounder eggs and larvae, because in a warm winter the entire bay exceeds that value (PG&E-NEG, 2001). However, EPA believes this fact supports its selection of threshold temperatures. In warm winters, because of long-term water temperature rise, Mount Hope Bay may be a less than optimal habitat for winter flounder spawning and larval development, even without added heat from BPS. Jeffries and Tereceiro (1984) first correlated winter flounder abundance in Narragansett Bay with winter water temperatures and found that warm winters resulted in poor recruitment. Therefore, there is natural variability in flounder abundance that is strongly temperature driven. Keller and Klein-MacPhee (2000) offer one explanation for this supported by experimental evidence. David Taylor has extended this work to include field studies, and his results support Keller and Klein-MacPhee's work. Both studies showed that sand shrimp predation on winter flounder eggs and larvae increase with warmer winter water temperatures.

The hydrothermal model was run using 1999 water temperature data as the ambient temperature. Based on 10 years of data, this was shown to be the warmest year. Ideally, it would have been preferable to run the model 10 times using each year of data as the ambient or background temperature. This would have allowed the Agency to predict with varying thermal discharges how often and over what area of the bay winter water temperatures exceeded 5 ºC. Time would not allow for the completion of this, however, and EPA felt that sufficient information was available to make a reasoned decision.

The permittee suggests that EPA characterizes any temperature below the threshold temperature as "benign" and anything exceeding it as requiring the plant to shutdown. This is incorrect. Nowhere in EPA's permit, Fact Sheet, or July 22, 2002, Permit Determinations Document does EPA say that BPS should be shut down. Thermal discharge limits must be set somewhere, and EPA believes it has set them at a reasonable point in light of the relevant science and data and CWA § 316(a)'s requirements that variance-based limits assure protection and propagation of the BIP. Moreover, EPA points out that all parties have agreed that installation of cooling technologies will actually allow BPS to increase electrical generation during peak hot weather periods, without running afoul of the permit's thermal discharge limits. Currently, the facility can be constrained by its discharge temperature limits during the hottest periods of the year.

EPA also understands that even temperatures below its threshold temperatures do not represent a "no impact" scenario. To be protective, EPA focused on the most sensitive life stage of the most sensitive species for each season. EPA also split the water column into the bottom water for demersal species and the rest of the water column for pelagic species. In consideration of ambient temperatures, the Agency selected data from 1999, the warmest of the 10 years for which data existed. EPA believes this was a reasonable approach, especially in light of data suggesting long-term temperature water increases in Mount Hope Bay. It also recognizes, however, that variability in temperatures will result in some years being cooler. Thus, the Agency believes its approach should be sufficient to reasonably assure the protection and propagation of the BIP in Mount Hope Bay. EPA acknowledges that biological systems are variable and as a result one could probably never select a temperature that would be 100 percent safe on all species all the time. That being said, EPA believes that by focusing on the most sensitive species and selecting temperatures that provide them with a reasonable level of protection, it will by extension assure protection for the rest of the community. In this particular case, winter flounder is the most sensitive species, and it is also one of the most ecologically, commercially, and recreationally important fish in the bay.

Jeffries, H.P., and W.C. Johnson. 1974. Seasonal distribution of bottom fishes in the Narragansett Bay area: seven-year variations in the abundance of winter flounder (*Pseudopleuronectes americanus*). *J. Fish. Res. Board Can.* 31:1057–1066.

Keller, A.A., and G. Klein-MacPhee. 2000. Impact of elevated temperature on the growth, survival, and trophic dynamics of winter flounder larvae: a mesocosm study. *Can. J. Fish. Aquat. Sci.* 57:2382–2392.

PG&E-NEG. 2001. Section 308 Information Request Response, August 10, 2001. 92 pp.

32. Comment
PG&E-NEG stated that the record supports the conclusion that an annual thermal discharge limit of 28 TBtu would not result in any appreciable harm to the fish populations of Mount Hope Bay. The permittee commented that it compared prevailing temperatures in “lower Mount Hope Bay” with those that would result in “upper Mount Hope Bay” under its proposed permit limits and found that only a small, biologically insignificant difference in temperature would result. The permittee stated that this difference would have “virtually no effect” on egg viability or winter flounder avoidance.

Response
EPA disagrees with PG&E-NEG’s conclusion that a discharge limit of 28 TBtus would not result in any appreciable harm to fish populations in Mount Hope Bay. This level of discharge would result in substantial areas of Mount Hope Bay being above avoidance temperatures for juvenile winter flounder, increased predation on winter flounder eggs, impacts on migration of striped bass and Atlantic menhaden, and exclusion of important habitat formers such as eelgrass. For a detailed discussion of these effects, see Chapter 6 of EPA’s July 22, 2002, Permit Determinations Document and responses elsewhere in this document.

33. Comment
PG&E-NEG stated that it is arbitrary to simplify matters to the point of setting “a single set of temperature thresholds for **all** demersal and **all** pelagic species” of fish (emphasis in original). The permittee stated that there are multiple species with different temperature thresholds involved in this matter and that although EPA is aware of this, it has not taken it into account. The permittee complained that EPA has not addressed how all these species would be affected by thermal discharges and, instead, has only focused on two species. According to the permittee, this is inconsistent with CWA § 316(a), which focuses on the entire balanced, indigenous community in the receiving water. The permittee stated that EPA guidance and administrative decisions indicate that CWA § 316(a) does not mandate that there can be no thermal impacts whatsoever. Instead, according to the permittee, there can be adverse effects (even significant adverse effects) on a few species, without necessarily requiring a finding that “appreciable harm” would occur. The permittee argues that by focusing on only two species, EPA has left itself unable to answer the questions regarding the balanced, indigenous population that must be answered to make a CWA § 316(a) determination.

Response
EPA agrees with the permittee that assuring the protection and propagation of a BIP under CWA § 316(a) does not mean that there can be **no** adverse effects whatsoever from the thermal discharge. Indeed, as the Agency has explained, the thermal discharge limits in the new permit for BPS issued by EPA will have **some** adverse effect on species that are part of the BIP. EPA has concluded, however, that these adverse effects are insufficient to undermine its reasonable assurance that protection and propagation of the BIP will be achieved. This is explained in Chapter 6 of EPA’s July 22, 2002, Permit Determinations Document and elsewhere in this document.

The permittee also argues that even significant adverse effects on a few species do not necessarily **require** a finding of appreciable harm to the BIP that would preclude a § 316(a) variance. EPA agrees with this statement to the extent that the commenter is saying that even significant adverse effects on a few species might not create a **100 percent** inviolate requirement that no § 316(a) variance could be issued. EPA disagrees with the comment to the extent that the commenter is trying to say that in all cases significant adverse effects on one or more species that are part of the BIP will be acceptable. The point is that each § 316(a) variance determination is unique and, accordingly, is rendered on a case-by-case basis. Therefore, the importance of particular adverse effects may vary depending on the facts of the case, such as the nature and severity of the adverse effect, the number of species adversely affected, the importance of the species that is being adversely affected, the background condition of the BIP, and the cumulative effect of this adverse effect when combined with other stressors. EPA's analysis takes these sorts of considerations into account and properly assesses whether the proposed variance limits will assure protection and propagation of the BIP.

EPA's approach in this permit is consistent with the 1977 Draft CWA § 316(a) Guidance Document and past permit decisions by the Agency. These discussions of how to apply § 316(a) clearly indicate that any significant adverse effects from the discharge may lead to denial of a variance application, and they certainly do not suggest that significant adverse effects are necessarily acceptable. See 1977 Draft 316(a) Guidance, §§ 3.3.2 and 3.3.3. Indeed, while EPA did not use the 1977 Draft Guidance to provide binding decision criteria for this variance application, if it were used in that way it would likely compel denial of the permittee's requested variance because of several important biological thresholds would be exceeded (e.g., discharge to an estuary causing winter flounder avoidance, increased winter flounder egg and larval mortality, interruption of normal fish migration, thermal exclusion of eelgrass). Similarly, the EPA Administrator's permit appeal decision in *In the Matter of Public Service Company of Indiana, Inc. (Wabash River Generation Station, Cayuga Generating Station*, 1 E.A.D. 590, 1979 EPA App. LEXIS 4, 28 (NPDES Appeal No. 78-6) (Nov. 29, 1979), is consistent with the analysis that EPA conducted for this permit and indicates that various types of adverse effects may lead to denial of a variance. Accord *In the Matter of Public Service Company of New Hampshire (Seabrook Station, Units 1 & 2)*, 10 ERC 1257, 1264 (U.S. EPA, NPDES Permit Application No. NH 0020338, Case No. 76-7, June 17, 1977).

The permittee's comment that EPA has considered thermal effects on only two species is incorrect. In fact, EPA considered possible thermal effects on numerous species that make up or support the BIP. It is true, however, that EPA used thermal tolerance data for the most sensitive species to help determine appropriate thermal discharge limits. This approach is perfectly appropriate under CWA § 316(a) and is consistent with the long-standing concept of focusing analysis on RIS. It is also clearly appropriate in this case, where commercially and/or recreationally important fish species such as winter flounder and striped bass helped to drive the permit limits because of their sensitivities to particular water temperatures. EPA's approach is also consistent with reasonable scientific practice, as well as other EPA permit decisions in which EPA based its analyses on "worst-case" conditions either by focusing on certain species that were most affected by the thermal discharge or by requiring investigation of the effects that would ensue under worst case background environmental conditions. See *Wabash*, 1979 LEXIS at 25-41; *Seabrook*, 1 E.A.D. 455 (Aug. 4, 1978).

34. Comment

PG&E-NEG stated that the "other heat effects" suggested by EPA are speculative and entitled to no weight in the CWA § 316(a) evaluation. The permittee argued that "no credible evidence" exists that these effects have occurred in the past due to BPS or that they would occur in the future with the permit limits it proposes.

a. **Lymphocystis:** The permittee stated that the rate of lymphocystis cited by EPA is incorrect and that EPA's data are unreliable. According to the permittee, EPA has also incorrectly stated that the thermal discharge has promoted a "significant outbreak of lymphocystis among striped bass and bluefish." The permittee stated that the disease rate EPA mentions for striped bass in the discharge canal—30 to 50 percent—is incorrect and is based on a single personal observation. More reliable figures from the same period indicate that the infection is significantly less than 1 percent. The permittee said that EPA relies on "a single personal observation" by a fisherman and that these data are unreliable, while the permittee collected more reliable data that found only four infected fish. The permittee also stated that only three bluefish were caught in the discharge canal from 1995 to 1997 during 905 hours of hook-and-line fishing, so that EPA's statement on p. 6-43 of EPA's Permit Determinations Document is clearly wrong. The permittee also stated that EPA incorrectly characterizes the danger of this disease. According to the permittee, the literature indicates that the disease is a chronic rather than fatal condition, that it alters the appearance of the fish but that their behavior is unchanged, and that it "tends to clear in the fall with declining water temperatures."

b. **Striped Bass and Bluefish Migration:** PG&E-NEG stated that BPS has no effect of any consequence on striped bass migration for two reasons: (1) only a small number of striped bass overwinter in the plume, as compared to the millions of striped bass that make up the coastal population of the species; and (2) striped bass have variable migration behavior—the young do not migrate and only some adults do (other adults never leave their natal waters). Since some striped bass do not migrate, and this "plasticity" in migration behavior is "normal," the permittee concluded that "there is no evidence" that the BPS thermal plume is disrupting their "normal migration." In addition, the permittee argued that given that only three bluefish were reported to have been caught in the discharge canal in 904 hours of hook-and-line fishing from 1995 to 1997, any concern about the thermal plume's interfering with bluefish migration is "pure speculation."

c. **Increase in Smallmouth Flounder:** PG&E-NEG stated that EPA engages in "baseless speculation" by suggesting that the increasing frequency of smallmouth flounder in Mount Hope Bay has been "accelerated or exacerbated" by BPS's thermal discharge. The permittee complained that while EPA references a communication from Grace Klein-MacPhee (AR 714) to support this point, the communication indicates that there are several theories that might explain the increase and that she does not really know why it is occurring. Furthermore, according to the permittee, EPA provides no evidence of a greater increase in smallmouth flounder in Mount Hope Bay than exists in Narragansett Bay. Finally, the permittee argues that it is not even clear that an increase is occurring, since the Wilcox trawl does not reveal such an increase. The permittee further stated that impingement data show that smallmouth flounder are neither new to the bay nor more abundant in recent years than in the 1970s, because "the highest annual estimate [of smallmouth flounder] is from 1976, 26 years ago, when 499 fish were impinged."

d. **Menhaden Impingement Events:** PG&E-NEG stated that EPA efforts to link menhaden impingement with BPS's thermal discharges is "unsupported speculation." According to the permittee, there is "no evidence" to support "EPA's suggestion that [thermal discharges have contributed to] the delay in migration [and] has caused these fish to become more susceptible to impingement" and it is utterly unsupported by any scientific evidence. Furthermore, the permittee stated that there is no evidence that these events affect the menhaden population as a whole. The permittee indicated that "menhaden that appear in Mount Hope Bay are part of an enormous offshore stock and even sizable fish kills . . . are not believed to have any meaningful effect on its populations' ability to thrive."

e. **Winter Flounder Being Driven to the Deep Trawling Stations:** PG&E-NEG stated that EPA's suggestion that BPS's thermal plume might drive winter flounder to congregate in the few deep spots of Mount Hope Bay is "not supported by any data." The permittee states that age 1 or older winter flounder simply prefer deeper water. The permittee also argued that the percentage of winter flounder caught in the deep station near the plant is not significantly greater than the percentage caught at other deep stations in Mount Hope Bay, including those far from the discharge, and that this indicates that the thermal discharge is not the cause of this problem.

Response

EPA's biothermal assessment consisted of several components, some entirely predictive and some based on observational field data. The entirely predictive component consisted of using model results from the hydrothermal model and comparing predicted ambient water temperatures to temperature thresholds of various sensitive species in Mount Hope Bay. In addition to that, EPA attempted to compile field data and observations of current thermal impacts in Mount Hope Bay and assessed whether the thermal reductions proposed by BPS would provide a reasonable assurance that these impacts would be mitigated. EPA also points out that there is presently no monitoring effort by the permittee or anyone else to comprehensively identify potential thermal impacts from BPS. Thus, EPA's list of Other Thermal Effects may not be complete. Below, EPA addresses each comment individually.

a. **Lymphocystis:** The incidence of lymphocystis in striped bass is discussed elsewhere in this document.

b. **Migration:** EPA maintains that the thermal discharge from BPS is disrupting the migration of striped bass, bluefish, and Atlantic menhaden in the fall. It has been well established that large numbers of striped bass, upwards of several thousand fish, and smaller numbers of bluefish, spend the winter in the discharge canal and thermal plume of BPS. PG&E-NEG suggests that some striped bass normally overwinter in Mount Hope Bay, though it provides no evidence to support this statement. PG&E-NEG also suggests that EPA's claim that BPS's thermal discharge may be disrupting bluefish migration is speculative, because only a small number of bluefish have been caught in the discharge canal. To the contrary, EPA relies on observations and information regarding the normal migratory behavior of striped bass and bluefish, rather than speculation, in concluding that the normal migration of both species is being disrupted by the thermal plume. In addition, there is abundant scientific literature showing striped bass being drawn to abnormally warm water from thermal discharges in the winter. Bluefish have also been observed in the discharge canal by fishermen in the winter. BPS's own sampling program found a small number of bluefish in the discharge canal during the winter. Furthermore, the discharge canal is a manmade structure, and the presence of fish in a manmade structure during a season when the majority of their kind have migrated farther south cannot be construed as "normal." Finally, large numbers of juvenile Atlantic menhaden have been impinged in "unusual impingement events" the last several winters. Atlantic menhaden are not known to naturally overwinter in any estuary north of Chesapeake Bay (Able and Fahay, 1998); thus, their presence in Mount Hope Bay in the winter is not "normal."

   PG&E-NEG dismisses these impacts as trivial based on the large numbers of striped bass, bluefish, and Atlantic menhaden along the Atlantic coast. It is certainly true that the large numbers of striped bass, Atlantic menhaden, and bluefish affected by BPS are small compared to the even larger Eastern Seaboard populations of these species. However, these species are part of the balanced, indigenous community of Mount Hope Bay, and that community is the appropriate frame of reference for this permit. These disruptions of normal migration patterns impact the BIP of Mount Hope Bay and need to be considered in that context.

c. **Increase in Smallmouth flounder:** Smallmouth flounder have been appearing more consistently in the RI DEM beach seine surveys, the MRI trawl surveys, and Grace Klein-MacPhee's icthyoplankton collections. A paper presented by Klein-MacPhee and coauthored by Mike Scherer of MRI suggests that these data sets, when considered together, represent an expansion of the range of this species. It is true that the cause of this expansion is unknown, but the two leading theories are that warming water temperatures make the habitat more suitable and the flounder are moving into an empty niche left by the decline of other demersal fish.

   BPS increases the water temperature in Mount Hope Bay, and EPA believes the station has significantly contributed to the decline in the demersal fish stocks. Thus, if either of the above theories proves to be true, BPS may have played some role in facilitating the expansion of smallmouth flounder into Mount Hope Bay. It is also possible that some other environmental change has triggered this expansion in the range of this species. EPA felt obligated to acknowledge this work as it was clearly relevant and publicly available, but the Agency did not accord substantial weight to it in its final decision because of the incomplete status of the research on the subject.

d. **Menhaden Impingement Events:** Able and Fahay (1998) report that the normal migratory pattern of juvenile Atlantic menhaden is to move out of their estuarine environments in the fall and travel south to warmer offshore waters. This emigration begins earlier in northern locations and starts progressively later in the year the farther south the population lives. They also report that juvenile overwintering has been reported between Florida and Chesapeake Bay, but some have been seen overwintering as far north as Delaware in power plant discharge plumes. BPS has recorded numerous large wintertime impingement events of juvenile Atlantic menhaden. Based on the normal migratory pattern of Atlantic menhaden, EPA believes it is reasonable to assume that the presence of juvenile Atlantic menhaden in Mount Hope Bay during the winter is likely due to the thermal discharge from BPS. In the winter, these fish would be trapped by their thermal preference in the discharge plume as ambient bay temperatures drop below temperatures in which they can survive. Periodic reentrainment of the thermal plume, sudden drops in thermal output, or even extended cold snaps can leave these fish vulnerable to impingement.

   PG&E-NEG again dismisses the loss of these large numbers of fish as trivial compared to the Atlantic coast population of this species. Once again EPA acknowledges that compared to the entire Atlantic coast population, the tens or hundreds of thousands of menhaden individuals lost to impingement do appear to be minor. However, once again, EPA believes the proper frame of reference is Mount Hope Bay and how these losses reflect on the properly functioning, balanced indigenous community. Viewed in the context of Mount Hope Bay, these losses may have a significant impact on the BIP.

e. **Winter Flounder Being Driven to the Deep Trawling Stations:** There is no question that winter flounder in Mount Hope Bay are demonstrating a preference for deeper water (water deeper than 20 feet). This was observed in both the RI DEM survey and the MRI survey, where approximately 80 percent of the total catch was from deeper water. In contrast, data from upper Narragansett Bay show that winter flounder there have a preference for shallow water, with 60 percent of the total winter flounder catch coming from depths of less than 20 feet (Tim Lynch, personal communication, 2003). Sediment type, food availability, and water quality do not appear to vary substantially between the deep and shallow water stations in Mount Hope Bay. Water temperature collected at the bottom during the RI DEM survey showed a substantial difference between the deep and shallow water stations in Mount Hope Bay (Table 1). The distribution of winter flounder in Mount Hope Bay changed with the season, strongly suggesting a temperature effect (Table 2). Thus, EPA believes that the thermal discharge is contributing to a shift in flounder distribution in Mount Hope Bay from shallow water habitat to deeper water habitat based on thermal preference data from the literature. This issue is also discussed in detail elsewhere in these responses to comments.

Table 1. Comparison of Average Monthly Bottom Water Temperature (°C) collected by RI DEM in Shallow (< 20 feet) and Deep (> 20 feet) Trawl Stations from 1990 to 2003 (Lynch, 2003)

Month	Shallow	Deep
January	3.65	3.72
February	3.11	2.79
March	4.91	4.33
April	7.82	6.62
May	14.64	12.57
June	19.20	16.89
July	23.23	20.37
August	23.96	21.51
September	21.25	19.99
October	14.59	14.08
November	9.59	9.85
December	5.96	5.98

Table 2. Average Depth Distribution of Winter Flounder by Month Expressed as Percent of Total Catch for Mount Hope Bay (1990 to 2003) (Lynch, 2003)

Month	Shallow	Deep
January	46	54
February	32	68
March	29	71
April	15	85
May	17	83
June	5	95
July	2	98
August	4	96
September	4	96
October	6	94
November	14	86
December	30	70

Able, K.W., and M.P. Fahay. 1998. *The first year in the life of estuarine fishes in the Middle Atlantic Bight*. Rutgers University Press, New Brunswick, NJ. 342 pp.

Lynch, T. 2003. Personal Communication, September 5, 2003.

35. Comment

PG&E-NEG stated that EPA's assessment of cumulative impacts related to BPS's thermal discharges is "unsupported and unsupportable." According to the permittee, EPA's analysis begins from the "flawed premise" that BPS must compensate for the adverse effects of other stressors in the bay. While acknowledging that EPA must consider cumulative effects in determining whether proposed thermal discharge limits will be adequate to protect the balanced, indigenous population of fish, shellfish, and wildlife in and on the receiving water, the permittee stated that this does not mean that BPS must compensate for other stresses. According to the permittee, EPA's goal of achieving the removal of fishing restrictions is improper in the context of a CWA § 316(a) determination because BPS should not be required to compensate for the effects of other stressors. The permittee stated that "the sole question is whether BPS operations are causing (or would cause) appreciable harm to the community of fish that would exist in the absence of the plant's impact," and "[i]f all of the observed effects on the community would be substantially the same **even if BPS was not present**, then BPS' [variance] demonstration is successful."

Response

EPA disagrees with the permittee's comment that EPA's cumulative impact assessment is "unsupported and unsupportable." The permittee acknowledges that in determining whether thermal discharge limits based on a CWA § 316(a) variance will assure the protection and propagation of "a balanced, indigenous population of shellfish, fish and wildlife in and on the receiving water" (the "BIP"), EPA must consider the cumulative effects of the thermal discharge and other adverse impacts on the BIP. EPA discussed this in § 6.2.2 of its July 22, 2002, Permit Determinations Document. See also 40 CFR § 125.73(a) (§ 316(a) variance applicant "must show that the alternative effluent limitation desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of . . . [the BIP]"); *Seabrook*, 10 ERC at 1261-62 ("the incremental effects of the thermal discharge should not cause the aggregate of all relevant stresses . . . to exceed the 316(a) threshold").

The permittee goes on to argue that EPA has devised thermal discharge limits designed to "compensate" for the adverse effects of others on the BIP and that this is inappropriate. Without commenting on the propriety or impropriety of attempting to devise permit limits that would compensate for other adverse effects on the BIP, the fact is that EPA did not develop the BPS permit limits on this basis. Rather, the Agency properly took other adverse effects into account in setting permit limits that satisfied CWA § 316(a). EPA did not impose requirements in the permit beyond those necessary to control the power plant's effects. The permittee's argument suggests that EPA determined the exact level of adverse effect from all other stresses on the BIP and devised thermal discharge limits for the power plant that would overcome not only its own effects but also all the other effects. Yet no such finely tuned calculus exists for setting thermal discharge limits, and EPA did not attempt develop permit limits on this basis. Having imposed thermal discharge limits (and cooling water intake limits) to control the plant's effects, EPA did not then go further and attempt, for example, to impose habitat restoration requirements. EPA properly and reasonably considered the effects of the thermal discharge and set limits for it, while taking into account adverse effects from other stresses.

Furthermore, as EPA discussed in detail in the July 22, 2002, Permit Determinations Document, other major stresses to the Mount Hope Bay fishery and ecosystem **are** being addressed. Fishing restrictions and water pollution control improvements are in place and/or under way. Without a proper application of

CWA § 316(a) and (b) to the BPS permit, the people and entities responsible for complying with these other requirements might well complain that **they** are being asked to overcompensate for the effects of the power plant.

The permittee comments that EPA's goal of facilitating the removal of fishing restrictions is improper (although elsewhere in its comments the permittee said this goal was "noble"). EPA would like to clarify its intent in this regard. As the Agency has stated, EPA's goal for permit limits to control thermal discharges is to reasonably assure the protection and propagation of the BIP in and on Mount Hope Bay. EPA expects, however, that achieving this goal will also help to allow the recovery of the fishery. EPA has concluded that the deterioration of the Mount Hope Bay fishery is the result of a combination of factors including the power plant's cooling system (i.e., thermal discharges to and water withdrawals from the bay) ***and*** overfishing. (Water pollution from various sources, including not only the City of Fall River but also the power plant itself, may also be contributing to the problem to some degree.) All of these factors must be addressed. This permit will address the power plant. Fishing is being restricted by both State and Federal requirements. Water pollution problems are also being addressed as appropriate in other permits and even enforcement actions. EPA's view is that for the fishery to recover and then remain in good condition, fishing restrictions are needed in addition to this NPDES permit, and will likely need to remain in place in the future. The hope is, however, that as the fishery's health recovers, these fishing restrictions can be loosened to allow a higher, sustainable level of fishing activity rather than the extremely strict restrictions that are presently necessary. The waters of Mount Hope Bay and the fishery that they should support are a public resource that should be protected and managed for the beneficial use of the public. Thus, while the **removal** of fishing restrictions would be the ideal goal, the **moderation** of fishing restrictions is probably a more realistic goal.

The permittee states that "the sole question is whether BPS operations are causing (or would cause) appreciable harm to the community of fish that would exist in the absence of the plant's impact ...." EPA disagrees to the extent that the permittee's statement implies that where a BIP has been depleted by factors that are not countenanced as acceptable modifiers of a BIP (see 40 CFR § 125.71(c)), then a thermal discharger can discharge as much heat as it wants even if those discharges would preclude recovery of the BIP. In other words, EPA does not agree that a thermal discharger can use existing environmental problems as a justification for adding to those problems when doing so would preclude assurance of the protection and propagation of the BIP.

In addition, the permittee states that "[i]f all of the observed effects on the community would be substantially the same **even if BPS was not present**, then BPS' [variance] demonstration is successful." First, as a factual matter, EPA concludes that the permittee has **not** demonstrated that either its existing operations or its proposed thermal discharge limits would yield a BIP exactly the same as if there was no discharge. Second, the statement goes too far. For example, EPA regulations state that a BIP normally will "not include species whose presence or abundance is attributable to the introduction of pollutants that will be eliminated by compliance by all sources with section 301(b)(2) of the Act." Therefore, if a BIP were altered in composition or abundance as a result of failures to comply with CWA § 301(b)(2), 33 U.S.C. § 1311(b)(2), then the permittee could not increase its discharge of heat to a higher level because it would be compatible with the degraded BIP. See also 1972 CWA Legislative History, p. 175 (Senate Consideration of the Report of the Conference Committee, October 4, 1972) (Remarks of Senator Muskie) ("It is not the intent of this provision to permit modification of effluent limits required pursuant to Section 301 or Section 306 where existing or past pollution has eliminated or altered what would otherwise be an indigenous fish, shellfish and wildlife population."). Similarly, if fish populations have been depleted by overfishing (and plant operations), it does not follow that a power plant can discharge higher levels of heat compatible only with these depleted populations. This becomes especially clear when overfishing **is** being addressed, as it is in this case. As stated above, the permittee cannot take advantage of these other problems to increase its thermal discharges.

36. Comment

PG&E-NEG stated that EPA incorrectly rejects overfishing as the reason for fish population declines. The permittee stated that EPA rejects overfishing as an explanation for the decline of fish species in Mount Hope Bay for the following reasons:

a. Massachusetts and Rhode Island have virtually eliminated all commercial and most recreational fishing through regulation.

b. The frequency distribution of winter flounder and windowpane flounder shows a lack of smaller fish.

c. The decline in Mount Hope Bay was extremely rapid.

d. 16 of the 20 finfish species in Mount Hope Bay show a similar rate of decline.

e. There is an absence of species replacement in Mount Hope Bay.

f. The impact was localized to Mount Hope Bay.

g. No recovery has occurred in Mount Hope Bay.

h. The only stressor that showed a significant change at the time of the decline was a change in operations at BPS.

The permittee then stated that "there is no credible evidence to support any of the reasons EPA offers for rejecting overfishing as the cause of the decline in Mt. Hope Bay." According to the permittee, EPA cannot rely on the effectiveness of fishery management plans to control overfishing because Massachusetts and Rhode Island have not "virtually eliminated commercial and recreational fishing." The permittee stated that "[f]ishing is still allowed and conducted on a regular basis for certain species [and] it is clear that there have been violations of the regulations that are in effect." The permittee noted that it has submitted letters by the Atlantic States Fishery Management Council alleging that Rhode Island was out of compliance with the plan for tautog in 1999 and that Massachusetts was out of compliance for scup in 1998 and 2001. According to the permittee, the remaining reasons offered by EPA rely entirely upon the reports prepared by Mark Gibson of the RI DEM, but the permittee stated that it has refuted Gibson's reports, so EPA cannot rely on them.

Response

EPA has never disputed that fishing mortality has played a significant role in the decline of fish populations in Mount Hope Bay. That being said, EPA does not believe that PG&E-NEG has refuted Gibson's analysis showing a statistically significantly different decline for four species in Mount Hope Bay compared to Narragansett Bay. Gibson's analysis suggests that some additional site-specific impact is affecting fish abundance in Mount Hope Bay. EPA's assessment of Gibson's study is discussed in detail in EPA's July 22, 2002, Permit Determinations Document and responses to comments elsewhere in this document.

In addition, Collie and Delong (2002) conducted a comprehensive review of all data related to winter flounder within Narragansett Bay and Mount Hope Bay. This review considered data for all winter flounder life stages and examined a number of possible sources of winter flounder mortality, including overfishing, cormorants, seals, precipitation, dissolved oxygen, water temperature, and chlorine discharges. The study showed that Mount Hope Bay exhibited mortality bottlenecks for winter flounder that were at different life stages than any other sectors examined in Narragansett Bay. The study also positively correlated mortality in three life history stages of winter flounder with BPS cooling water flow.

The authors stated, “There was clear evidence that increases in Brayton Point power plant coolant water flow affected winter flounder in Mount Hope Bay. We found that the flow through the power plant affected the survival of winter flounder larvae, as well as older aged flounder (YOY in the summer and during the third winter).” Finally, even PG&E-NEG’s own consultant concludes that BPS is having a measurable impact on 5 square miles of upper Mount Hope Bay. Thus, three separate investigators—a State government employee, an independent academic researcher, and a consultant to PG&E-NEG—have all concluded that BPS is having an impact on winter flounder in Mount Hope Bay beyond that inflicted by fishing mortality.

EPA offers the following additional views regarding fishing mortality. Overfishing certainly has occurred in the past and arguably continues for some species today. However, both Massachusetts and Rhode Island have implemented severe restrictions for commercial and recreational fishing in Mount Hope Bay and Narragansett Bay. For offshore Rhode Island and Federal waters, fishing mortality peaked in 1988 and has been curbed to about 33 percent of that level today. Additional restrictions on commercial fishermen are being considered, as Amendment 13 to the Northeast Multispecies Fishery Management Plan has been issued for public review. Fisheries managers intend to implement the plan, which will attempt to reduce fishing-induced mortality on winter flounder by 65 percent, by late spring of 2004. Thus, while fully acknowledging that overfishing is part of the problem, EPA is persuaded by the multiple analyses that have detected an impact on winter flounder populations from operations at BPS.

Collie, J.S., and A.K. DeLong. 2002. *Examining the decline of Narragansett Bay winter flounder,* Final Report to RI DEM Division of Fish and Wildlife. 150 pp.

37. Comment

PG&E-NEG stated that EPA “ignores” the role of “cormorant predation as a potentially significant factor in the fish decline and failure of fish to recover.” The permittee pointed to two recent studies of what it calls the “explosion of the cormorant population since the 1980s and its probable effect on fish populations.” According to the permittee, cormorant predation on small winter flounder “increased exponentially between 1984 and 1985” and remains at high levels. Moreover, the permittee stated that nesting and feeding patterns indicate more cormorant predation pressure on fish in Mount Hope Bay than in Narragansett Bay. The permittee also stated that while cormorant predation would not necessarily explain the original fishery decline, it would be “sufficient to contribute to the lack of recovery of winter flounder in Mount Hope Bay after fishing pressure was reduced.”

Response

EPA acknowledges that cormorants have increased substantially since the 1980s; however, it finds that the analysis submitted by PG&E-NEG overstates the importance of this source of mortality to winter flounder. In addition, the Agency must emphasize that the decline of fish populations has also occurred in a number of species in addition to winter flounder. Four species showed a statistically greater decline in Mount Hope Bay than in Narragansett Bay: winter flounder, windowpane, hogchoker, and tautog. These are all demersal fish, but have different life histories. PG&E-NEG provided no data or analysis of cormorant predation on these other species.

PG&E-NEG submitted comments by its consultant Dr. Deborah French McCay, including her report entitled “Estimating Impacts of Cormorants on Fish Populations in Narragansett Bay Estuary.” This document states that “the natural mortality of juvenile winter flounder in the Narragansett Bay Estuary (NBE) increased exponentially from 1980–1997 due to increases in the local cormorant breeding population” and that this “increase in mortality is significant relative to other sources of mortality of juvenile winter flounder.” French McCay contends that the “estimated increase in cormorant predation rate is sufficient to explain the lack of recovery…of fish abundance in the Narragansett Bay estuary discussed by Gibson (1996, 2002) and EPA….” French McCay further asserts, “[O]ur analysis and calculations confirm that cormorant predation is significant on winter flounder populations.”

The analysis whereby French McCay arrives at these conclusions is strictly a mathematical exercise that derives a series of predictions based on untested assumptions about the foraging behavior, physiology, and life history of cormorants in Narragansett Bay. Her analysis is not based on any site-specific data to confirm these predictions. French McCay does not have the scientific evidence to determine the magnitude of cormorant predation on juvenile winter flounder in Narragansett Bay, and no comparisons were made to other forms of predation to determine whether cormorant predation is significant relative to the others. Within this analysis are several assumptions that are untenable based on actual data and others that are highly questionable. These assumptions are detailed below.

Cormorant Foraging

Throughout her comments, French McCay assumes that cormorants are “opportunistic fish eaters” that “prefer” or “target” “slower-moving demersal species.” French McCay also assumes that cormorants are “exclusively piscivorous” (p.11). By focusing only on slow demersal fish species, French McCay ignores the breadth of information presented in works cited in her own comments. According to the scientific literature, cormorant prey preferences switch depending on the availability of prey in the suitable size range (Derby and Lovvorn 1997). Cormorants have been documented to eat schooling pelagic fish, demersal fish, crustaceans, molluscs, and aquatic insects (Clapp et al., 1982; Ehrlich et al.; 1988; Lewis 1929; Wires et al., 2001). A 1995 RI DFW study of the gut contents of 67 cormorants from Hope Island and Sakonnet Point found that on average only 8.7 percent of the diet of the cormorants sampled was winter flounder. French McCay uses the results of this study to suggest that cormorants “target” winter flounder “preferentially to all species available.” Without knowing the other contributions to cormorant diet, it is not clear how important winter flounder are relative to other species. However, it is clear that the 67 cormorants sampled were not targeting winter flounder, because most of their diet was composed of other food sources. French McCay’s assertion that cormorants preferentially select winter flounder is simply untenable based on the published literature and site-specific data collected in Narragansett Bay.

French McCay assumes that cormorants in Narragansett Bay behave like cormorants studied in other systems and thus that they will fly only 8 to 16 kilometers to their foraging grounds (Palmer, 1962) and only forage in water <8 meters deep within 5 kilometers of the shoreline (Wires et al., 2001). In addition, French McCay assumes that foraging behavior is equally distributed across all waterbodies. The latter assumes that fish dispersion patterns do not change, which clearly is not the case for schooling or migrating fish found in Narragansett Bay (e.g., herring, bay anchovy, butterfish, scup, menhaden). Given that the scientific literature abounds with descriptions of the breadth of cormorant diets, and that they have been documented to switch prey depending on availability, a major flaw in French McCay’s analysis is the assumption that winter flounder will always constitute 8.7 percent of a cormorant’s diet despite the time of year or the location of cormorant foraging. French McCay does not take into account the real-world temporal and spatial variability of cormorant prey. Furthermore, French McCay’s predictions remain questionable without verification that the cormorants in the Narragansett Bay area forage only in the areas that she assumed for the purposes of her analysis (e.g., she assumes that all the cormorants nesting at Sakonnet Point forage only in the Sakonnet River and Mount Hope Bay).

Cormorant Physiology

French McCay’s entire analysis hinges on two physiological parameters that she takes from the literature. The first is the basal metabolic energy needs of a two-kg cormorant (0.82 kJ/day at 11 ºC). This figure comes from a study on the North Platte River in Wyoming (Derby and Lovvorn 1997). No basal metabolic energy requirements were determined for the population of cormorants residing in the

Narragansett Bay area. Further, no basal metabolic energy requirements were determined for the range of temperatures that cormorants are likely to experience in the April to October time frame during which cormorants are most frequently found in the Narragansett Bay area. Clearly, the energy needs of a cormorant at 11 ºC cannot accurately represent the energy needs of a cormorant in the Narragansett Bay area, where air temperature from April to October ranges from 0 to 30 ºC.

The second important physiological parameter that French McCay takes from the literature is the conversion rate of fish to energy (5 kJ energy/g of fish). Once again, this figure comes from the Platte River study where the major species consumed were sucker and stocked trout fingerlings (Derby and Lovvorn, 1997). Given the wide breadth of prey species in the cormorant diet documented in the literature, it is unlikely that this conversion rate applies to all the prey species in the diet of Narragansett Bay cormorants.

The fact that French McCay's analysis depends on these two site-specific physiological values derived for a study in Wyoming seriously calls into question her predictions about the number of winter flounder consumed by the Narragansett Bay area cormorants.

Cormorant Life History

Other major untested assumptions in French McCay's analysis are the number of cormorants per nesting pair, the number of young cormorants per nest that fledge, and the survivorship of fledglings. As with her assumptions about foraging behavior and physiology, French McCay assumes that fledging success and fledgling survivorship in Narragansett Bay are equivalent to rates found in other studies. These are untested predictions that should have been verified to account for local differences in these rates. Regarding the number of cormorants in the population per breeding pair, French McCay assumes that the rate of population growth in cormorants across all regions of Narragansett Bay is exponential, even though the data presented in her analysis (p. 6, Table 1; p. 7, Figure 2) describe a stable population for both the Sakonnet Point and Little Gould Island roosts (those closest to and, according to McCay, most likely to feed in Mount Hope Bay) beginning in 1986 and 1995, respectively. McCay estimates the size of the Narragansett Bay population of cormorants based on a ratio of four nonbreeders for every pair of breeders, as documented by Hatch (1995) for exponentially increasing populations. This ratio was not confirmed for the Narragansett Bay population of cormorants and, as stated above, likely does not apply to the cormorants most likely to feed in Mount Hope Bay. In using this ratio, French McCay likely overestimates the true population of cormorants in the Mount Hope Bay area and therefore overestimates their energy needs and predatory impact.

In summary, French McCay presents an inferential argument for the magnitude of cormorant predation in Narragansett Bay. The analysis is based on information on cormorant foraging behavior, physiology, and life history culled from studies done in freshwater systems. Assumptions made by French McCay for this study are untenable or questionable, and the net effect is to overstate the relative importance of cormorant predation on winter flounder in Mount Hope Bay.

In any event, EPA recognizes that cormorants may well take some winter flounder from Mount Hope Bay. That, however, is a natural process that EPA does not, and could not, regulate under the CWA. Therefore, it becomes another cumulative pressure on fish stocks that EPA must consider in determining thermal discharge limits under CWA § 316(a) that will assure the protection and propagation of the BIP. That being said, EPA does not believe cormorant predation is as large a factor as the permittee suggests.

Clapp, R.B., R.C. Banks, D. Morgan-Jacobs, and W.A. Hoffman. 1982. *Marine birds of the southeastern United States and Gulf of Mexico. Pt. 1: Gaviformes through Pelicanformes.* FWS/OBS-82/01. Fish and Wildlife Service, Washington, DC.

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Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. *The birder's handbook, a field guide to the natural history of north american birds.* Simon Schuster Inc., New York, NY. 785 pp.

Hatch, J.J. 1995. Changing populations of Double-Crested Cormorants, pp. 8-24 in D.N. Nettleship and D.C. Duffy, eds. *The Double-Crested Cormorant: biology, conservation, and management. Colonial Waterbirds.* 18 (Special Publication 1).

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Palmer, R.S. ed. 1962. *Handbook of North American birds.* Vol. 1. Yale University Press. New Haven, CT.

Wires, L.R., F.J. Cuthbert, D.R. Trexel, and A.R. Joshi. 2001. *Status of the Double-Crested Cormorant (*Phalacrocorax auritus*) in North America*. Final Report to the U.S. Fish and Wildlife Service, Washington, DC.

38. Comment

PG&E-NEG stated that EPA erroneously rejected the results from the "RAMAS population model." The permittee complained that EPA and the TAC "required" the permittee to develop and apply the RAMAS model to integrate heat and flow impacts on winter flounder populations, but the Agency then rejected the model because it did not like the results. The permittee also asserted that "BPS temporarily discontinued work on the RAMAS model because it was informed by EPA that the results of the model would never be accepted no matter what changes were made to improve it." The permittee stated that the model showed that BPS had only a minimal effect on the Mount Hope Bay winter flounder population under current operations and that effects under the new limits proposed by the permittee would be negligible. According to the permittee, EPA has complained that the model's results did not fit the data from the mid- to late 1970s or post-1996, but the company has now solved this problem. The permittee indicated that at the time of the initial modeling work, it did not have all the RI DFW sampling data or the analyses of its consultants Joseph DeAlteris (regarding fish abundance) and Deborah French McCay (regarding cormorants). The permittee also indicated that it had redone all the modeling, including this new information, and the results now "fit" the data. According to the permittee, "[t]he revised RAMAS modeling confirms that the fish species in Mount Hope Bay will recover under BPS's requested permit limits" for thermal discharge and that these limits would adequately protect Mount Hope Bay's winter flounder. The permittee stated that the model results confirm that a "raw annual population effect (conditional mortality) from entrainment and impingement of winter flounder of about 10 percent will not prevent recovery" of the bay's population of this species. The permittee also stated that EPA has concluded that a 26 percent loss is acceptable and, therefore, that a 10 percent effect must also be acceptable.

Response

To evaluate the permittee's request for a CWA § 316(a) variance, EPA required the permittee to submit scientifically sound analyses to demonstrate that its proposed thermal limits would satisfy § 316(a) biological standards. EPA did not dictate what specific analyses, approaches or use of models had to be used. EPA, as part of the BPS TAC worked with the permittee for many years in determining the types of analyses and approaches that would be appropriate to support its variance application. The permittee was never restricted to using approaches advocated by the TAC and was free to submit additional information as it saw fit. In fact, the TAC and the permittee disagreed over numerous aspects of PG&E-NEG's

temperature polygon assessment, yet despite these disagreements the permittee submitted the resulting information.

Furthermore, EPA did not indicate to the permittee that it would never accept the results of the RAMAS model no matter what changes were made to improve it. Prior to the permittee's use of the RAMAS model, EPA and the TAC made it very clear to the permittee and its consultants that any model submitted in support of its variance application must be able to re-create historical changes in abundance to assure reviewers of its ability to predict future changes. This is basic, sound science. The RAMAS model was not able to do that, most notably failing to re-create changes in the mid-1970s and erroneously predicting a recovery in Mount Hope Bay in the mid-1990s. The permittee claims that it has improved the model by including analysis from DeAlteris on fish abundance and French McCay on cormorants. EPA has reviewed the analyses completed by DeAlteris and French McCay and has significant disagreements with many of their assumptions and final conclusions. See responses elsewhere in this document for EPA's critiques of these analyses. The permittee relies exclusively on the French McCay analysis to "correct" the divergence between the predicted model results produced by the RAMAS model and the actual field data for the mid-1990s. However, French McCay's analysis relies heavily on a number of questionable assumptions for which she cites one scientific paper. Todd Callaghan of the TAC contacted one of the authors of this paper, who disputed several of the critical assumptions that French McCay makes. His e-mail communication is included in EPA's Administrative Record for this permit. At this point, EPA believes that the RAMAS model still is not able to adequately replicate past winter flounder abundance changes and thus cannot be viewed as a reliable predictive tool.

The permittee also produced a model to predict conditional mortality. It should be noted that this analysis was done independent of any input from the TAC. Using this model, the permittee predicted a conditional mortality of 10 percent. Members of the TAC disagreed with a number of assumptions that went into this model and felt that it significantly underestimated conditional mortality. Those concerns were detailed in Chapter 7 of EPA's § 316(a) and (b) Permit Determinations Document. In addition, it is worth noting that MA CZM stated that it believed the 10 percent conditional mortality figure was an underestimate, but even if it was not, the value was very high for a stock that was not recovering (Appendix B, § 316(a) and (b) Permit Determinations Document).

Finally, EPA disagrees with the permittee's statements regarding EPA's assessment of conditional mortality. First, EPA has never stated that a 26 percent loss is "acceptable." Second, the Agency disagrees with the permittee's assertion that its Enhanced Multi-Mode proposal would result in only a 10 percent loss. See responses elsewhere in this document for a detailed explanation of these points.

39. Comment
PG&E-NEG stated that EPA indicated that "'members of the TAC were especially critical of USGen NE's analysis of finfish diversity …[, which] artificially limited the sample number to 50 fish, out of a sample total much greater than that, in the samples from 1972 to 1986[, and] reduces the number of species present.'" The permittee also quoted EPA as stating that, "'This bias was not present in samples after 1986, when only 50 fish were being caught in all of the trawls combined.'" The permittee responds that "[r]educing the sample size does not necessarily reduce the number of species collected" and EPA is incorrect to suggest that this necessarily biased the results.

Response
Based on the information submitted by PG&E-NEG, EPA maintains that the permittee's decision to limit the sample size used in its finfish diversity index was unsupported and might have biased the result. In samples taken after the collapse of fish stocks in 1984–1985, the 50 fish comprising the sample size represented all the individuals in a sample. For the 1972–1985 time period, samples contained greater than 50 individuals per sample, in some cases substantially more than 50 individuals. In order to validate

this approach, the permittee should have demonstrated that the subsample of 50 fish was representative of each of these larger samples. The permittee did not make this demonstration. EPA agrees that this subsampling scheme does not automatically bias the results, but without justification demonstrating the representativeness of the subsampling scheme, it is impossible to know.

40. Comment

The permittee complained that “EPA indicates that BPS ‘submitted a prospective analysis suggesting that their future operations would allow for the recovery of a balanced indigenous community.’” The permittee stated that it clearly presented “both a retrospective and prospective demonstration.”

Response

EPA agrees that the permittee submitted both a “retrospective” and a “prospective” demonstration document seeking a thermal discharge variance under CWA § 316(a). EPA, in fact, evaluated the permittee’s variance application from both perspectives. See, e.g., § 6.4.2 of EPA’s July 22, 2002, Permit Determinations Document.

41. Comment

PG&E-NEG argued that EPA incorrectly concludes that it may disregard costs in rendering a CWA § 316(a) variance determination. The permittee stated that EPA reached this conclusion on the basis of a “conclusory assertion.” While acknowledging that CWA § 316(a) makes no mention of cost, the permittee argued that Congress intended that “costs, and cost effectiveness, would be considered in determining the appropriate level of thermal reduction under Section 316(a).” The permittee states that CWA § 104(t) required EPA to conduct studies on the subject of controlling thermal discharges, including costs, and that Congress must have meant to have these costs considered in implementing § 316(a). The permittee also argued that doing so would not be inconsistent with the Supreme Court’s ruling in *Whitman* v. *American Trucking Association*, 531 U.S. 457 (2001), because CWA § 104(t) expressly directs the Administrator to consider the § 104(t) studies in applying § 316(a).

Response

EPA disagrees with the permittee’s argument that the Agency incorrectly concluded that costs are not a proper consideration in rendering CWA § 316(a) variance determinations. The permittee also incorrectly claims that EPA reached this conclusion based on a “conclusory assertion.” EPA’s conclusion in this regard is consistent with the language of CWA § 316(a) and the Agency’s longstanding interpretation of it. Moreover, EPA’s view is based on consideration of the statutory language, the legislative history, EPA regulations, EPA permit decisions, and other relevant case law. This is explained, with pertinent references provided, in § 6.2.2 of EPA’s July 22, 2002, Permit Determinations Document. In response to the permittee’s comments, additional discussion is provided below.

When interpreting a statute, executive agencies (and the courts) must first look to the statutory language. If the language is clear, then the inquiry is at an end and the language must be followed. See e.g., *Whitman* v. *American Trucking Association*, 531 U.S. 457, 481 (2001) (citing *Chevron U.S.A.* v. *Natural Resources Defense Council*, 467 U.S. 837, 842-43 (1984)). The language of CWA § 316(a) is absolutely clear: the costs of compliance are not valid considerations in rendering thermal discharge variance decisions under § 316(a). The sole criteria for granting a thermal discharge variance under § 316(a) are (a) that the effluent limits that would otherwise apply under CWA §§ 301 or 306 are more stringent than necessary to assure protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on the receiving water (the “BIP”), and (b) that the permitting agency decides to impose alternative thermal discharge limits that will be sufficient to assure the protection and propagation of the BIP. 33 U.S.C. § 1326(a). Thus, the plain language of the statute dictates that thermal discharge variance decisions under CWA § 316(a) are made on biological grounds alone.

Contrary to the permittee's claim that Congress intended for EPA to consider compliance costs in rendering § 316(a) variance decisions, the legislative history of the provision confirms the plain meaning of the statutory language: that thermal discharge variance determinations must be based solely on the specified biological considerations. This is revealed by Congressional statements regarding the intent and import of CWA § 316(a). See CWA of 1972 Legislative History, p. 175 (Senate Consideration of Conference Committee Report, Oct. 4, 1972 - remarks of Senator Muskie). Accord Id., pp. 263–264 (House Consideration of Conference Committee Report, Oct. 4, 1972). The intent that determinations would be based on biological considerations is further evident from the history regarding the evolution of the provisions that ultimately became § 316(a). The Conference Committee Report for the CWA of 1972 explains that while the Senate bill would simply have treated the discharge of heat in the same manner as any other pollutant subject to §§ 301 and 306, the House bill had proposed a version of § 316 that would have called for separate regulations to provide a unique standard to govern thermal discharges, as well as a case-by-case variance based on a test involving a comparison of costs against benefits. The Conference Committee substituted a provision that was finally enacted as § 316(a), which provided that heat would be treated like any other pollutant, except for the creation of the limited variance specified in § 316(a). Notably, consideration of costs and benefits was not included in this provision. Id., p. 320 (Conference Committee Report, Sept. 28, 1972). See also Id., p. 175. Thus, the legislative history is entirely consistent with the reading of § 316(a) presented above.

EPA's interpretation of the plain language of § 316(a) also makes complete sense in the overall statutory scheme. In the absence of a § 316(a) variance, thermal discharge limits are to be based on the more stringent of technology-based or water quality-based requirements. The discharge of heat is governed by the BAT standard as explained in § 4.2.3 of EPA's July 22, 2002, Permit Determinations Document. This technology standard **does** require costs to be considered to the particular degree specified by Congress (i.e., costs are to be considered but cost-benefit balancing is not required). Id. at § 4.2.3b. Cost implications may also be considered in certain ways by states in setting their water quality standards. See e.g., 40 CFR §§ 131.10(g)(6) and (i), 131.3(g). Therefore, Congress dictated that costs would be factored into setting thermal discharge limits under technology-based and water quality-based requirements in a particular manner and to a particular extent.[3] Congress then decided, however, to allow less stringent limits under a limited variance if the specified biological standard was met. While costs were to be considered in setting the baseline limitations, they were not to be a consideration in determining whether to grant a variance from those baseline standards. Of course, if an applicant does not qualify for a thermal discharge variance under § 316(a), then the applicant's thermal discharges are simply to be regulated under technology-based or water quality-based requirements under which cost **would** be relevant to the extent dictated by the statute.[4]

All of the above shows that Congress considered the issue of cost with respect to thermal discharge, as with other discharges, and specifically identified when and how costs should be considered. See 33

[3] With respect to water quality standards, costs are relevant in that States may consider costs in certain ways in **setting** their standards. Of course, as explained elsewhere, once these standards are set, it is well established that they must be complied with regardless of cost. See § 5.2 of EPA's July 22, 2002, Permit Determinations Document. See also, e.g., *Ackels* v. *United States*, 7 F.3d 862, 865–66 (9th Cir. 1993).

[4] It is worth noting that Congress also took another step related to the costs of controlling thermal discharges with the enactment of CWA § 316(c). This provision provides for a "period of protection" from new thermal discharge limits for 10 years "or the period of amortization or depreciation" for a facility that undergoes modification after October 18, 1972, and, as modified, meets limits based on § 301 or 303 (water quality) and these limits will assure protection and propagation of the BIP. This further shows that Congress was cognizant of cost issues related to the control of thermal discharges, but decided not to make them a relevant consideration in § 316(a).

U.S.C. § 304(b)(2). Where Congress plainly did not dictate that costs should be considered, as it did not with respect to CWA § 316(a), EPA can properly conclude this was intentional.

EPA has, in fact, interpreted CWA § 316(a) in this manner in its regulations. EPA's regulations governing the criteria for § 316(a) variance determinations, 40 CFR Part 125 Subpart H, dictate that cost and economic considerations are not proper considerations. The criteria set forth in the regulations address solely biological considerations as directed by the statute.

Furthermore, in its permit appeal decision in *In the Matter of Public Service Company of Indiana, Inc. (Wabash River Generation Station, Cayuga Generating Station*, 1 E.A.D. 590, 1979 EPA App. LEXIS 4, 41-43 (NPDES Appeal No. 78-6) (Nov. 29, 1979), EPA directly addressed the question of whether or not costs were appropriate considerations in making CWA § 316(a) variance determinations and concluded they were not. The Administrator of EPA explained:

> [t]he Regional Administrator had concluded that the provisions of § 316(a) "require a demonstration by the permittee which is totally biologically oriented . . ." and there is no "provision for the application of economic factors in the consideration of alternative thermal effluent limitations." I agree. Consideration of economic factors is only appropriate in setting the original thermal limitations from which the § 316(a) variance is sought on biological grounds. This is true whether the original thermal limitations are derived from Federal technology-based effluent limitations or from state water quality standards (as in the present case). In the case of state water quality standards, the Agency allows the states to take costs into consideration; however, if they do not, that is their choice. [Citation omitted.]
>
> The plain language of § 316(a) requires this result. The decision to grant or deny a request for less stringent thermal limitations pursuant to § 316(a) hinges solely on proof of the biological effects of the discharges. Terms commonly used to denote cost considerations are notably absent from § 316(a), in contrast to other provisions of the Clean Water Act. Compare § 304(b)(1) & (2) (speaking of practicability and achievability) and § 306(b)(1)(B) (speaking of the cost of achieving effluent reduction). Consequently, cost considerations should not be read into § 316(a). [Citation omitted.] Moreover, as the Regional Administrator noted, the Senate and House managers rejected a provision which would have established an economic link in § 316(a). While such rejection is not conclusive, it weighs heavily, particularly when, as here, the alternative is at odds with the plain language of that section. [Citation omitted.]

Wabash, 1979 EPA App. LEXIS at 41-43 (citations and footnotes omitted). Accord In re Central Hudson Gas and Electric Corporation, et al., EPA GCO 63 (July 29, 1977) (Issue of Law No. VII) ("Under Section 316(a) the applicant has the ultimate burden of persuasion and economic considerations are not appropriate . . ..").

While acknowledging that CWA § 316(a) makes no mention of cost, the permittee argued that CWA § 104(t), 33 U.S.C. § 1254(t), indicates that Congress intended EPA to consider costs in making § 316(a) variance determinations. CWA § 104(t) required EPA, working with other parties, to conduct studies and gather data concerning the environmental effects of thermal discharges, possible methods of controlling thermal discharges, the potential environmental effects of using these methods, and the economic feasibility and cost-effectiveness of different methods. CWA § 104(t) also directed that the results of these studies should be reported by EPA “not later than 270 days after October 18, 1972, and [that they] shall be made available to the public and the States, and considered as they become available by the Administrator in carrying out section 1326 of this title and by the States in proposing thermal water quality standards.”

The permittee argues that this language indicates that Congress intended EPA to consider costs in rendering individual § 316(a) variance decisions. EPA disagrees for several reasons. To begin with, as discussed above, this is simply inconsistent with the both the plain language of § 316(a) and the legislative history concerning § 316(a) which indicate that costs are not a proper consideration. It would also be inconsistent with the approach that Congress devised under which costs could be considered in setting technology-based standards for thermal discharges, and under which States can consider cost in particular ways in setting water quality standards, but cost was not to be considered in addressing a § 316(a) variance application. The permittee’s approach would allow a cost test to be injected into § 316(a) that could potentially cancel the consideration of costs under § 301 and the biological criterion of § 316(a).

Moreover, it is not at all clear that the language of § 104(t) means what the permittee suggests. Instead, § 104(t) can be read to indicate that the results of the report were to be considered by the Administrator in developing regulations for thermal discharges under § 316(a) and perhaps §§ 301, 303, and 306 (and possibly for use in developing cooling water intake regulations under § 316(b)). After all, the report was to be submitted within 9 months of enactment of the statute (i.e., in 1973), which was before the pertinent regulations had been developed. Moreover, the legislative history related to § 104 generally, and 104(t) specifically, supports this reading of the statute, rather than the reading offered by the permittee. In the House Consideration of Conference Committee Report, Representative Clausen stated as follows:

> Subsection 104(t) provides that the Administrator shall conduct continuing comprehensive studies of the effects and methods of control of thermal discharges. The results of these studies shall be reported by the Administrator no later than 270 days after enactment and shall be considered by the Administrator *in proposing regulations* with respect to thermal discharges under Section 316 and by the States in proposing thermal water quality standards. These studies will provide needed data and should be very helpful to the Administrator *in proposing regulations*. The Administrator should consider the results of these studies *in promulgating regulations* not only under section 316 but also under other sections of the act where thermal discharges may be regulated, including section 301 on effluent limitations, section 303 on water quality standards, and section 306 on new source performance standards.

CWA of 1972 Legislative History, p. 264 (emphasis added). See also *Id.* at pp. 186, 273, 285. Thus, § 104(t) directed EPA to conduct research and issue a report intended to be considered in developing regulations.[5] It does not direct that cost and economic factors be considered in making individual variance determinations under § 316(a).[6]

Furthermore, the permittee's reading of § 104(t) would be inconsistent with the structure of the CWA, under which standards setting for pollutant discharges is governed by the provisions of Subchapter III of the Act entitled, "Standards and Enforcement." This subchapter includes § 316(a) as well as §§ 301, 303, 304, and 306, all of which govern the setting of various types of standards for regulating thermal (and other types of pollutant) discharges. CWA § 104(t) is found in Subchapter I of the Act, which addresses "Research and Related Programs." Section 104, 33 U.S.C. § 1254, is titled, "Research, investigations, training and information," and CWA § 104(t) creates a research and reporting requirement. It does not expressly or clearly dictate that economics should be considered in rendering § 316(a) variance determinations. EPA does not believe that Congress would have undertaken such a fundamental alteration of the criteria for setting thermal discharge standards under a variance by placing the requirement in an ancillary provision, in a different subchapter of the statute that does not address standards setting, and then make statements in the legislative history indicating that no such alteration was intended. As the Supreme Court stated in *Whitman* v. *American Trucking Association*, 531 U.S. 457, 468 (2001), "Congress, we have held, does not alter the fundamental details of a regulatory scheme in vague terms or ancillary provisions -- it does not, one might say, hide elephants in mouseholes." (See more detailed discussion of American Trucking further below.)

Similarly, in *American Textile Manufacturers Institute* v. *Donova*n, 452 U.S. 490, 510-13 (1981), the Supreme Court rejected an argument that a particular general definition in the Occupational Safety and Health Act (OSHA) required cost-benefit balancing in setting certain OSHA standards where the specific standards setting provision plainly did not. The plain language of the provision only required that feasibility be considered. The Court explained that, "[w]e decline to render Congress' decision to include a feasibility requirement nugatory, thereby offending the well-settled rule that all parts of a statute, if possible, are to be given effect . . .[,]" and cautioned that "we should not 'impute to Congress a purpose to paralyze with one hand what it sought to promote with the other.'" *Id.* at 513 (citations omitted). This reasoning applies equally well to support rejecting the permittee's argument regarding §§ 104(t) and 316(a).

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[5] PG&E-NEG states that "carrying out" 33 U.S.C. § 1326 consists **entirely** of reviewing individual variance applications and, therefore, it must mean that costs should be considered in individual variance determinations. Yet, this is clearly not so. As Representative Clausen's remarks indicate, when 104(t) was being enacted in 1972, EPA still had yet to develop regulations for regulating thermal discharges under either §§ 301, 306, or 316(a) (and also had not promulgated regulations under § 316(b)). The § 104(t) report was intended to be used in the regulation development process and apparently it was. See *Appalachian Power Co.* v. *Train*, 545 F.2d 1351, 1369 (4th Cir. 1976).

[6] Even if § 104(t) was read to require ongoing consideration of §104(t) reports in future implementation decisions under § 316(a), it would not necessarily mean that it was intended to indirectly inject cost considerations into the evaluation criteria of § 316(a) contrary to the language of that provision. Instead, § 104(t) might simply be a source of information to be used under the various standards setting provisions for thermal discharges (i.e., §§ 301, 303, 306, and 316) to the extent that these provisions authorize consideration of the particular information. The § 104(t) report was supposed to gather information regarding technology, and economic and environmental issues. Under § 316(a), only the biological information would be relevant. Under §§ 301 and 306, technology and economic information would be relevant. This reading, like the view that § 104(t) merely required a report to assist in regulation development, would harmonize § 104(t) with the standards setting provisions of the statute without doing violence to the plain language of § 316(a). The permittee's proposed reading of § 104(t), however, would put the provision at odds with § 316(a).

In light of the above, the most that can be argued is that § 104(t) might create an ambiguity regarding whether costs should be considered in making § 316(a) variance determinations. However, EPA has clearly interpreted § 316(a) not to require the consideration of costs in making variance determinations. This is clearly a reasonable interpretation that would be entitled to judicial deference under *Chevron*, 467 U.S. at 843.

Finally, the permittee urged that in light of CWA § 104(t), considering costs in this CWA § 316(a) variance determination would not be inconsistent with the Supreme Court's ruling in *Whitman* v. *American Trucking Association*, 531 U.S. 457 (2001). EPA disagrees. Although EPA did not actually cite *American Trucking* as a specific reason for concluding that costs are not a proper consideration in making variance decisions under CWA § 316(a), see § 6.2.2 of EPA's July 22, 2002, Permit Determinations Document, the Agency feels that the case supports its conclusion.

In *American Trucking*, the Supreme Court held that EPA could **not** consider costs in setting NAAQS under the Clean Air Act (CAA). As a CAA case, *American Trucking* is not strictly determinative of whether costs can be considered in rendering variance decisions under CWA § 316(a). Still, EPA believes that the Supreme Court's reasoning in *American Trucking*, when applied in this context, leads to the conclusion that costs cannot be considered under § 316(a).

The *American Trucking* Court's analysis began with the fact that the operative CAA provision, 42 U.S.C. § 7409(b)(1), authorizing EPA to set NAAQS does not indicate that costs are to be a factor in setting the standards. Since it makes no mention of costs as a relevant consideration, the Court concluded that the language "does not permit the EPA to consider costs in setting the standards," and that the language was "absolute." 531 U.S. at 465 (citation omitted). The language of CWA § 316(a) is similarly "absolute." The Court further explained that since other standards setting provisions in the CAA did authorize the consideration of costs, it "therefore refused to find implicit in ambiguous sections of the CAA an authorization to consider costs that has elsewhere, and so often, been expressly granted." 531 U.S. at 467. As discussed above, this reasoning would also indicate that Congress did not intend costs to be considered under CWA § 316(a) because the provision makes no mention of costs, whereas **other** CWA standards setting provisions **do** authorize the consideration of costs (e.g., § 304(b) governing certain technology-based standards).

The Court said that to overcome these points, the respondents in the case would need to show a "textual commitment" that Congress authorized EPA to consider costs in setting NAAQS. *Id.* at 468. The Court further explained that the textual commitment needed to be "clear" because the "Congress, we have held, does not alter the fundamental details of a regulatory scheme in vague terms or ancillary provisions – it does not, one might say, hide elephants in mouseholes." Id. See also *American Textile Manufacturers Institute* v. *Donovan*, 452 U.S. 490, 510-13 (1981). The Court then went on to reject various arguments regarding whether certain words in the standards setting provision for the NAAQS actually made the provision ambiguous as to whether costs could be considered. *Id*. No such arguments can even be fairly presented concerning the language of CWA § 316(a), given the clarity of its terms.

The Court also rejected arguments that costs could be considered in setting NAAQS because while the CAA did not actually specify that costs could be considered, it also did not specify that they could not be. The Court explained that Congress could not have intended to allow cost considerations because it clearly required NAAQS to be based on public health protection, and costs "are so indirectly related to public health and so full of potential for canceling the conclusions drawn from direct health effects that it would surely have been expressly mentioned in [CAA] §§ 108 and 109 had Congress meant it to be considered." Id. at 469. Similarly, costs have no relationship to the protection and propagation of the BIP, and a cost-based test could potentially "cancel" conclusions regarding what is otherwise necessary to assure the protection and propagation of the BIP, which, after all, is both the standard of § 316(a) and an important minimum goal of the CWA. See 33 U.S.C. § 1251(a)(2).

Finally, just as the permittee points to CWA § 104(t), the respondents in *American Trucking* pointed to provisions other than the NAAQS setting provision which required EPA to produce reports to be issued regarding air pollution control equipment and the costs of construction and operation of such equipment. *Id*. at 469–70. The respondents argued that this made no sense unless costs could be considered in setting NAAQS. The Court disagreed. It concluded that it was sensible for Congress to require the reports to help provide information to the States, but it had “no bearing” on whether Congress had decided that costs would or would not be taken into account in actually setting the NAAQS at the Federal level. *Id*. at 470–71. Similarly, the fact that Congress directed EPA to prepare a § 104(t) report for EPA and State use in regulation and water quality standards development, respectively, has no bearing on whether Congress intended to have costs taken into account in individual variance determinations under CWA § 316(a). The Court held in *American Trucking* that CAA § 109(b) unambiguously barred consideration of costs in setting NAAQS; a similar analysis would lead to the same conclusion with respect to CWA § 316(a).

42. Comment
PG&E-NEG stated that even apart from its argument regarding CWA § 104(t), EPA still is not “entitled to wholly disregard costs” in making a CWA § 316(a) determination. The permittee argued that even when a statute is silent, consideration of economic factors may be a necessary component of reasoned decision making under two cases decided by the United States Circuit Court of Appeals for the District of Columbia: *American Petroleum Institute* v. *EPA*, 216 F.3d 50 (D.C. Cir. 2000); and *Chemical Manufacturers Assoc'n* v. *EPA*, 217 F.3d 861 (D.C. 2000). The permittee further argued that where the costs will be high and the result will not achieve the stated environmental objective, it would not be reasoned decision making not to consider these costs.

Response
EPA disagrees with the permittee’s suggestion that the consideration of cost is necessarily a part of “reasoned decision making” under CWA § 316(a). EPA believes that making decisions consistent with the criteria set out by Congress constitutes reasoned decision making and Congress dictated that costs would not be considered in making variance determinations under CWA § 316(a). Certainly, any general legal argument that costs must always be considered whenever a statute does not expressly state that they **cannot** be has been laid to rest to by the Supreme Court’s decision in *Whitman* v. *American Trucking Association*, 531 U.S. 457, 465-71 (2001), as discussed elsewhere in this document. Indeed, having held in *American Trucking* that costs could not be considered in setting NAAQS under the CAA, the Court also made clear that NAAQS could be set aside if they were had been on costs. *Id.* at 471 n. 4. See also *City of Waukesha* v. *EPA*, 320 F.3d 228, 240-41 (D.C. Cir. 2003) (where a cost-benefit analysis would not be relevant for setting a particular Safe Drinking Water Act standard, EPA did not need to prepare a cost-benefit analysis for the record because “a cost-benefit analysis would have no consequence and the agency is justified in concluding that Congress did not intend to require it to undertake such a futile exercise”).

It is up to Congress to determine when and how costs should be considered in setting standards for thermal discharges and it has done so: costs are relevant for setting technology-based standards; they also may be factored into a State’s setting of water quality standards (though they are not relevant for setting permit limits to meet water quality standards); and costs are not relevant to rendering § 316(a) variance determinations. There is nothing about this that is antithetical to “reasoned decision making” under the law. See *Ackels* v. *United States*, 7 F.3d 862, 865–66 (9th Cir. 1993) (permit limits must meet State water quality standards regardless of economic and technological feasibility).

The permittee cited *American Petroleum Institute* v. *EPA*, 216 F.3d 50 (D.C. Cir. 2000), in support of its position, but the case is inapposite to the present issues. The dispute in that case was over whether EPA had properly characterized a substance ("oil-bearing wastewaters") as a discarded waste subject to regulation under the RCRA, or whether the material had not yet truly been discarded because the industry could still garner beneficial uses from it. It the latter was true, the material would not be subject to regulation. *Id.* at 55. The court found that EPA's decision that the material had been discarded was arbitrary and capricious and remanded the matter to the Agency for further proceedings. *Id.* at 58. The court noted that in deciding that the material was being discarded as a waste by the industry, EPA did not consider the relative costs and benefits to the industry of the material, or otherwise explain why EPA felt the material had truly been discarded. *Id.* at 57. This consideration of costs and benefits was only relevant for determining whether the material in question would actually have been discarded by the industry and, thus, would be a waste subject to regulation. This has nothing to do with the question of whether the cost of compliance with environmental regulations generally, or § 316(a) in particular, must be assessed to constitute reasoned decision making under the applicable law.

The other case cited by the permittee, *Chemical Manufacturers Ass'n* v. *EPA*, 217 F.3d 861 (D.C. 2000), is also inapposite. This CAA case involved EPA's interpretation of an ambiguous compliance provision and a situation where EPA's stated rationale for its decision was not supported by the record. *Id*. at 865–66. Specifically, this case involved EPA setting compliance deadlines for waste combustion facilities to comply with certain air emissions standards. *Id.* at 862. (The applicable standards setting provision expressly required consideration of costs, technological capabilities, and environmental and health benefits. *Id.* at 862.) EPA set a 3-year compliance date for facilities that proposed to modify their equipment in order to meet the new emissions standards, but EPA also set a 2-year "early cessation" deadline for any facility simply planning to close rather than make modifications to comply with the new standards. *Id.* at 863.

The controversy in Chemical Manufacturers Association was over the early cessation date. EPA had stated in its record that environmental benefits would accrue from the early cessation of the facilities not planning to meet the new standards. *Id*. at 863. However, the court found that EPA admitted that it had no evidence of such benefits and that the wastes would likely just be transferred to other combustion facilities so that there would likely be no environmental improvements and perhaps even environmental harm. Id. at 865–66. The court held, and EPA agreed, that the CAA was ambiguous regarding the legality of the early cessation requirement. Id. at 866. The court also held that EPA's action in adopting it was arbitrary and capricious since the agency did not provide a satisfactory rationale for its action and, indeed, its claimed rationale was admittedly at odds with the facts. Id. at 866. The court also found that given the CAA's goal of environmental protection, it was unreasonable to interpret the ambiguous provision in the CAA to allow the early cessation program when the record did not show it would provide any benefits and might cause harm. Id. at 866–67. The court remanded the matter to EPA and stated that if EPA produced a record showing that the previously claimed benefits would result—and the court allowed that this was possible—then the early cessation program might be upheld. Id. at 867.

This case has nothing to do with the issues at hand here. First, it says nothing about whether cost must be considered under CWA § 316(a) or any other standards setting provision that expressly does not require it. Second, there is no suggestion that EPA's interpretation of § 316(a) would be somehow inconsistent with the environmental protection purpose of the statute as existed with EPA's interpretation of the ambiguous compliance provision in *Chemical Manufacturers*, which EPA had interpreted to allow an early cessation requirement that might cause environmental harm. Indeed, EPA's interpretation clearly furthers the CWA's environmental purposes by focusing on the stated statutory goal of assuring protection and propagation of the BIP. (As we have stated previously, EPA recognizes that outside the § 316(a) variance process, costs are a proper consideration in developing a technology-based standard under CWA § 304(b)(2).) Third, EPA is not dealing with an ambiguous statutory provision here because the language of § 316(a) is clear. Fourth, there is no demonstration, much less any admission, that EPA has stated a rationale for finding an environmental benefit that is demonstrably inconsistent with the facts. The permittee might disagree with EPA's biological analysis, but that does not create a legal obligation to consider costs under § 316(a).

43. Comment
PG&E-NEG stated that EPA arbitrarily set its alternative, CWA § 316(a) variance-based thermal discharge limit of 1.7 TBtu annually. According to the permittee, EPA offers no good reason for the limits it selected. The permittee argues that while EPA suggests the 10 percent areal cutoff as a reason, it offers no biological explanation for picking 10 percent. Further, the permittee complained that EPA gives no explanation for the 5 days per month threshold for violating the critical temperatures. The permittee concludes that these thresholds are "ill reasoned and arbitrary." The permittee argues that the "real" reason for the limit is to allow 122 hours of once-through cooling in order to prevent fogging from the cooling towers. In other words, states the permittee, there is really no biological basis for limit at all.

Response
EPA's thermal discharge limits are neither arbitrary nor without biological basis. In setting the thermal limits, EPA considered scientific literature on species-specific temperature thresholds, future plant operation, background water temperatures, the location of winter flounder nursery habitat near BPS, and results from PG&E's hydrodynamic model. For a detailed discussion of the reasoning and data supporting EPA's determinations, see Chapter 6 of the July 22, 2002, Permit Determinations Document and other responses in this document.

The fact that EPA has developed these permit limits in the face of unavoidable scientific uncertainty does not render them arbitrary. EPA has made reasonable judgments consistent with the applicable law and regulations, as well as with sound scientific practice. Also, EPA did **not**, as the permittee alleges, develop the permit's thermal discharge limits in an effort to allow a certain amount of cooling tower bypassing so as to avoid possible problems from water vapor plumes from the cooling towers. EPA discussed the reasoning behind the bypass allowance in Chapter 6 of EPA's July 22, 2002, Permit Determinations Document. EPA merely noted that if the power plant developed cooling towers with bypass capability, it could engage in a certain amount of bypassing according to the thermal discharge limits EPA set under § 316(a), and that this could help minimize any vapor plume concerns that might arise.

44. Comment
PG&E-NEG stated that 9 years of data support either eliminating or reducing the canal inspection requirement. The permittee comments that permit condition A.22 requires inspection of the discharge canal, the discharge canal net, and the nearby beach every other day from April to November for dying fish, and that BPS has undertaken such inspection since 1993 but has observed only one dead fish. The permittee stated that divers clean the nets three or four times a week and are also instructed to tell the company of any fish mortality observed. The permittee commented that this requirement should be eliminated, or at least changed, to apply from June to September when water temperatures are higher.

Response
Due to the dramatic reduction in thermal discharge required by the permit, and the fact that divers are frequently inspecting the nets in the discharge canal, EPA has eliminated this permit requirement.

Response # III.45	**Document #**:1033

Comment
EPA received one comment stating that the thermal discharge is affecting the Sakonnet River in Rhode Island.

Response
Satellite imagery collected by NASA and interpreted by Jack Mustard of Brown University shows that there certainly are times when the Sakonnet River in Rhode Island is affected by the thermal plume from BPS. The level and frequency of this impact are proportional to the distance from the point of discharge. Therefore, the magnitude and frequency of the thermal impact in the Sakonnet River are less than those seen at Spar Island and points closer to the discharge.

Response # III.46	**Document #**: 1037

Comment
EPA received one comment stating that Mount Hope Bay is 1.5 degrees warmer than similar shallow coastal waterbodies.

Response
EPA agrees. According to satellite imagery interpreted by Jack Mustard of Brown University, during the summer and fall of the year, Mount Hope Bay is on average 1.5 ºF warmer than similar shallow coastal waterbodies. This is a baywide average value. Actual temperatures at locations closer to the point of discharge are higher than the average, and temperatures at locations more distant from the point of discharge are lower. It should be noted that field data collected in conjunction with aerial thermal imagery show that the temperature detected by satellites or aerial imagery represents the temperature of the water to a depth of at least 6 feet. During the winter and spring, the thermal plume was often not visible by satellite. It is suspected that the plume becomes submerged and dispersed through the bay closer to the bottom. Heat exchange in a submerged plume is much lower than in a plume on the surface in contact with the atmosphere. Therefore, it is reasonable to assume that in the winter and spring, the difference in the average temperature of the plume and ambient water temperature is even greater than 1.5 ºF.

Response # III.47	**Document #**: 1066, 1067, 1095

Comment
EPA received three comments stating that the thermal discharge limit for the permit should be 0.8 trillion Btus per year.

Response
EPA believes that the limit set by this permit, 1.7 trillion Btus per year, is sufficient to ensure the protection and propagation of the balanced indigenous population of shellfish, fish, and wildlife in Mount Hope Bay. For a complete discussion on the derivation of the thermal discharge limit, see the Agency's responses regarding § 316(a) elsewhere in this document.

Response # III.48	**Document #**: 1095

Comment
EPA received one comment stating that there is a significant difference in blue crab populations in the Kickamuit River compared with the Palmer River in Rhode Island. The commenter attributes the difference in population levels to the operation of BPS.

Response

EPA is unaware of any blue crab catch data or population census data for these locations and is therefore not able to verify this claim. If the commenter is aware of specific data that addresses this point, EPA would welcome their submission.

Response # III.49	**Document #:**1008, 1236

Comment

EPA received two comments disputing the Agency's estimate of the percentage of striped bass that are suffering from lymphocystis in the discharge canal. One of the commenters also disputed the validity of using a hook and line survey method and whether lymphocystis was a fatal condition.

Response

EPA's concern regarding lymphocystis arose when the Agency became aware that large numbers of striped bass and bluefish were overwintering in the discharge canal of BPS. EPA became concerned about the health and general condition of these fish, as well as the potential for a large fishkill. Lymphocystis is a highly contagious disease that has been found to be especially prevalent among fish residing in dense schools in thermal effluents. This disease is fatal to a certain percentage of the fish that get it. At a minimum, it indicates diminished health in the individuals that contract it.

On March 20, 1997, EPA sent New England Power, the owner of the facility at the time, an information request asking for an estimate of both the number of fish in the canal and the prevalence of lymphocystis. EPA did not require the company to use a specific sampling method for the fish in the discharge canal. Obviously the company needed to consider safety and plant operations. Trawling and gillnetting within the channel is not possible because of the strength of the current within the channel. A rod and reel survey was the only safe way to sample fish in this location.

As to the actual percentage of striped bass suffering from lymphocystis, EPA acknowledges that the incidence of lymphocystis does vary annually and with the season. However, EPA has relied on the most recently generated data from BPS. On April 8, 1997, New England Power sent a response to EPA's information request, estimating a population of 3,000 to 4,000 striped bass in the discharge canal. New England Power estimated the incidence of lymphocystis at 30–50 percent. EPA cited these data in its 316(a) and (b) Determinations Document. In submitting its comments on the Draft Permit, PG&E-NEG refers to data generated by its consultant from 1995 to 1997 that showed a much lower incidence of lymphocystis among striped bass in the discharge canal. It is unclear why the former owners of BPS did not submit these data in 1997 in response to EPA's information request instead of initiating a new sampling effort and reporting those results. The data submitted in 1997 represent the most recent information available, and EPA deems it to be credible. Regardless of which data set the Agency relies on, both submissions indicate some incidence of lymphocystis among striped bass, and thus the potential for an outbreak continues to exist. The presence of this disease is indicative of, at a minimum, an environmentally stressful situation for the fish that is associated with the thermal discharge and that does lead to mortality in a percentage of infected individuals.

Response #III.50	**Document #**:1008, 1236

Comment

EPA received two comments stating that global changes in jellyfish populations are responsible for the observed changes in comb jelly abundance in Mount Hope Bay, and BPS's thermal plume is not contributing to this change.

Response

In Chapters 6 and 7 of EPA's *Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from BPS in Somerset, MA* (July 22, 2002), EPA discusses the current scientific theories on the proliferation of comb jellies. Comb jelly abundance has increased in a number of areas. Scientists have looked at the environmental factors common among some of these locations. Increases in nitrogen and water temperature are the two most consistent factors. Since water temperature plays a role in the proliferation of comb jellies and thermal discharge from BPS has increased water temperature in Mount Hope Bay, BPS is likely contributing to this phenomenon.

Response #: III.51	**Document #**:1022

Comment

EPA received one comment expressing concern about the impact of pollutants to winter flounder, tautog, and other fish in Mount Hope Bay.

Response

It is not clear what specific pollutants the commenter had in mind. However, the permit the Agency issues today is designed to protect Mount Hope Bay from negative impacts associated with a number of pollutants, including heat. Chapter 6 of EPA's *Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from BPS in Somerset, MA* (July 22, 2002) discusses the impact of the thermal discharge on Mount Hope Bay fish populations.

BPS also uses chlorine and a number of biocides to control biofouling of the condenser tubes. This permit represents a significant reduction in the use of chlorine and some biocides as a result of the implementation of a new condenser cleaning system. The permit limits for chlorine and biocides are based on a review of laboratory toxicity data and estimates of initial dilution in the bay. EPA was conservative in its estimate of initial dilution, using a dilution factor of 5 to 1. In addition, EPA reviewed laboratory toxicity testing data for the biocides used at BPS. The manufacturer of these products tested their effects on numerous species, and upon reviewing these results, EPA selected a value that was protective of the most sensitive marine species. This value, in conjunction with the initial dilution value, was used to derive a chronic permit limit of 0.0375 mg/l and an acute limit of 0.065 mg/l.

Response #: III.52	**Document #**: 1028, 1099

Comment

EPA received one comment expressing concerns about the mass mortality of blue mussels and sea stars in Portsmouth, Rhode Island, and near the Sakonnet River Bridge, while another commenter expressed concern about mass blue mussel mortality observed along the shoreline of Common Fence Point.

Response

Although EPA does not speak to these specific events, mass mortalities of blue mussels do occur with some frequency in Mount Hope Bay and areas of Narragansett Bay. Phil Colarusso and Eric Nelson of EPA observed a large quantity of blue mussels agape in Mount Hope Bay, just south of Spar Island in September 2002. These mortalities may be the result of increased water temperature and decreased dissolved oxygen. Research conducted at the Millstone Nuclear Power Station in Connecticut has shown that mussels begin to experience heat-induced mortality when water temperatures reach 25 degrees Celsius (Johnson et al. 1983). Johnson et al. (1983) found that mortality was 100 percent by 27 ºC. In addition, thermal modeling done by consultants for PG&E-NEG shows that in warm summers under the current plant operations, water temperatures for almost the entire bay can exceed 25 ºC for days at a time (Figure 1).

Low dissolved oxygen may be another factor in mussel mortality. Low dissolved oxygen conditions increase the physiological stress on aquatic organisms, making them significantly more susceptible to the toxic effects of other pollutants (Rand and Petrocelli 1985). Mount Hope Bay does experience low dissolved oxygen. Moreover it is likely that BPS's thermal discharge directly and indirectly reduces dissolved oxygen concentrations in Mount Hope Bay. First, raising the temperature of water reduces the solubility of oxygen in it. Simply put, warmer water holds less oxygen than colder water. Second, bacterial degradation of organic matter, a process called respiration, which uses oxygen, increases with temperature. Third, the thermal discharge can create a thermocline in the water column that would limit aeration of the bottom waters. EPA believes that the thermal discharge from BPS is contributing to low dissolved oxygen concentrations in Mount Hope Bay. Additionally, thermal modeling done by consultants for PG&E-NEG shows that under the current plant operations, water temperatures in almost the entire bay exceed 25 ºC for days at a time during warm summers (Figure 1). However, the area of the bay exceeding 25 ºC would be greatly reduced if PG&E-NEG implemented closed-cycle cooling. Currently, EPA believes that BPS is likely contributing to the frequency and magnitude of the mussel die-offs observed in Mount Hope Bay by elevating water temperature and lowering dissolved oxygen concentrations.

Johnson, G., J. Foertch, M. Keser, and B. Johnson. 1983. "Thermal backwash as a method of macrofouling control at Millstone Nuclear Power Station, Waterford, Connecticut, USA." Symposium on Condenser Macrofouling Control Technologies: The State of the Art. I. A. Dias-Tous, M.J. Miller, and Y.G. Mussalli, eds., EPRI CS-3343, Electric Power Research Institute, Palo Alto, CA, 25-1-25-15.

Rand, G.M. and S. R. Petrocelli. 1985. Fundamentals of Aquatic Toxicology, Hemisphere Publishing Corporation, Washington. pp 666.

Response #: III.53	**Document #**: 1132, 1133, 1148, 1180

Comment
EPA received four comments suggesting that the proposed thermal limits for the permit are not stringent enough to ensure the protection and propagation of the balanced indigenous population.

Response
EPA carefully reviewed potential thermal impacts associated with various control technologies using modeling results and comparisons to species-specific temperature sensitivity information. As with most biological analyses, there is some degree of uncertainty associated with the determinations that are made. However, EPA's analysis concludes that this level of control is sufficiently protective to allow for the protection and propagation of the balanced indigenous community of fish shellfish and wildlife of Mount Hope Bay. If subsequent data suggest that additional controls are still needed, this decision can be revisited at each permit reissuance (every 5 years), or, if there is substantial new information, additional controls can be required by the permitting agencies at any time.

Response #: III.54	**Document #**: 1133

Comment
One commenter stated that PG&E-NEG's proposed enhanced multi-mode system will not protect the balanced indigenous population of Mount Hope Bay.

Response
EPA agrees. EPA evaluated the potential impacts associated with the permittee's proposed enhanced multi-mode system and determined that this proposal did not sufficiently reduce the impacts associated with plant operation to protect the balanced indigenous population of marine organisms in Mount Hope Bay. For more detailed information, please refer to Chapters 6 and 7 of EPA's *Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from BPS in Somerset, MA* (July 22, 2002).

Response #: III.55	**Document #**: 1133

Comment
A commenter stated that PG&E-NEG's proposed enhanced multi-mode system could result in a thermal discharge that acts as a barrier to migration or causes avoidance behavior in fish.

Response
In developing the Draft Permit, EPA considered published literature values for fish temperature preferences and observations of fish behavior in the bay. This included temperature values for herring and other migratory fish that might have migration routes impacted by the increased temperatures. Certainly, PG&E-NEG's proposed enhanced multi-mode system represents a reduction in the thermal discharge and an improvement compared with current conditions. However, EPA still has concerns about impacts on fish migration and avoidance of areas. Under current conditions, significant numbers of striped bass and bluefish eschew their normal southerly migration and reside in the thermal plume and discharge canal over the winter. Additionally, large schools of Atlantic menhaden have been found in Mount Hope Bay in the winter. This represents a disruption of their normal migratory behavior. This attractant effect may be slightly reduced by the proposed enhanced multi-mode, but it is unlikely to substantially reduce the number of fish affected. According to information the company submitted to EPA in 1997, the estimated number of striped bass that overwintered in the thermal plume and discharge canal was 3,000 to 4,000 in 1997. BPS also documented an incidence of lymphocystis, a contagious disease associated with concentrated numbers of fish in thermal discharges, at 30–50 percent.

In addition, with the proposed enhanced multi-mode system, PG&E-NEG predicts that water temperatures during warm summers will be sufficient to cause some chronic toxicity in juvenile winter flounder in the lower portions of the shallow river systems along the north shore of the bay. Finally, 80 percent of the bottom waters of the bay during warm summers would exceed temperatures that trigger avoidance in juvenile winter flounder. As global water temperatures continue to increase, the frequency and duration of these avoidance temperatures being exceeded in Mount Hope Bay will only increase. BPS's thermal discharge serves to exacerbate the situation.

Response #: III.56	**Document #**: 1133, 1161

Comment
Two commenters stated that PG&E-NEG's variance request is flawed for the following reasons:

- The methodology employed was not sensitive to varying heat loads and changes in ambient temperatures.
- The company's model is based on inappropriate assumptions concerning acclimation, tolerances, and migratory blockage.
- The studies conducted by the company do not evaluate ecosystem-induced impacts of elevated temperatures and avoidance behavior.
- The methodology employed to estimate temperature elevations from the proposed limits underestimates the impacts by averaging and basing predictions on thermal output levels that are less stringent than those requested.

Response
In crafting the Draft NPDES Permit for BPS, EPA and other Federal and State resource agencies worked together with the plant's owners for several years in an attempt to develop a comprehensive approach to assessing BPS's impacts on Mount Hope Bay. Multiple models were envisioned that would assess how the thermal plume moved around the bay, how dissolved oxygen concentrations in the bay were affected by the thermal discharge, and how losses from entrainment and impingement and the degradation of habitat would affect winter flounder populations in Mount Hope Bay. In addition, the results from the hydrodynamic model were to be compared with scientific data on temperature tolerances of the list of representative important species (RIS).

These commenters question a number of assumptions that were the basis for several of these modeling efforts. EPA reviewed these models and had concerns with specific approaches or assumptions used in several of them. EPA agrees with many of the concerns articulated by these commenters. For the details of the Agency's concerns, see Chapters 6 and 7 of EPA's *Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from BPS in Somerset, MA* (July 22, 2002).

Response #: III.57	**Document #**: 1133, 1180

Comment
Two commenters requested a more comprehensive environmental monitoring program, one that includes monitoring water temperatures throughout the bay.

Response
The existing water quality monitoring program includes seven stations in Mount Hope Bay for temperature, dissolved oxygen, and salinity. Data are collected at these stations every 4 to 5 days from March through September and once a month from October through February. This level of effort will be

supplemented by adding four sampling locations and requiring the deployment of continuous temperature recorders at each station. These systems include monitors at the surface and near the bottom at each location (Figure 2). This will supplement the existing monitoring program and, when taken in conjunction with data from the buoys deployed by the State of Massachusetts, will give a more complete picture of plume dynamics in the bay.

Response #: III.58	**Document #**: 1136, 1161

Comment

Two comments stated that the large decline in fish stocks is an indication that the balanced indigenous population is not being protected. This dramatic decline cannot be explained by regional overfishing or pollution. In cases of regional overfishing, there has been an almost simultaneous increase in nontarget species, and overall fish biomass has stayed constant. In Mount Hope Bay, aggregate fish abundance has declined, suggesting that the habitat is not able to sustain the same finfish biomass regardless of which species are present.

Response

EPA recognizes that fish populations in Mount Hope Bay experience impacts from a number of different stressors, including fishing, BPS cooling water withdrawals, and water pollution (including thermal discharges). In addition, these populations experience natural mortality from a variety of predators. For a more specific discussion of the importance of overfishing to fish populations in Mount Hope Bay, see pages 6-47 to 6-50 in EPA's July 22, 2002, Permit Determinations Document.

BPS operations add to the total list of stressors that these populations already face. The station's thermal discharge elevates water temperatures throughout large sections of the bay and exacerbates water quality problems in the bay by contributing to low dissolved oxygen concentrations. The cooling water intake impinges and entrains large numbers of adult, juvenile, and larval fish and fish eggs. EPA has concluded that BPS operations have contributed to the collapse of the bay's finfish populations and are interfering with a recovery of the balanced indigenous community.

Although it may be hard to quantify the relative magnitude of each stressor, the evidence suggests that BPS operations represent a significant stressor for Mount Hope Bay. Aggregate fish abundance estimated from bottom trawls has declined significantly. This has happened in Narragansett Bay as well, but with a corresponding increase in pelagic fish species. However, it is not possible to determine from existing data whether a shift to pelagic species has occurred in Mount Hope Bay. The Marine Research, Inc. (MRI) bottom trawl survey and the Rhode Island Department of Environmental Management trawl survey are directed at demersal species but do catch some pelagic species in the process. Quantitative analysis of catch rates of pelagic species in bottom trawls is difficult and should be approached with great caution. Typically, catch rates of pelagic species in bottom trawls tend to be very low, and variability in sampling can make drawing any definite conclusions from the data difficult. A bottom trawl samples a discrete portion of the water column and will target fish that are on or near the bottom very effectively. However, if a species can be oriented anywhere within the water column or is oriented toward the surface, a bottom trawl is a poor choice of sampling gear. In addition, differences in depth between stations can result in the net's sampling different percentages of the vertical water column, making comparisons highly problematic. All that being said, the reduction in biomass in demersal species is so large that even with the low catch efficiency of the bottom trawls, it is likely that they would have detected a significant increase in pelagic species. Neither the MRI trawl series or the State of Rhode Island survey in Mount Hope Bay has detected a substantial increase in pelagic species.

Response #: III.59	**Document #**: 1148

Comment
One commenter states that the cumulative effect of a long-term temperature rise in Mount Hope Bay is creating a more narrow range of suitable temperatures for native species and a wider range of suitable temperatures for nuisance species. This will only increase the difficulty of restoring depleted fish stocks and the balanced indigenous community.

Response
EPA agrees that the long-term increase in water temperature makes restoring a balanced indigenous population to the Mount Hope Bay ecosystem a more difficult challenge. During the process of deriving discharge limits for the Draft Permit, EPA cited long-term temperature rise as one reason to select conservative assumptions in the analysis for setting thermal discharge limits.

Response #: III.60	**Document #**: 1148

Comment
EPA adopted a critical threshold temperature of 24 °C in the summertime based on adverse effects on juvenile winter flounder. One commenter felt that value was not sufficiently protective.

Response
The selection of 24 °C does not represent a “no effects” temperature. The literature and experts in the field suggest that sublethal effects will become apparent beginning at 20 °C. However, EPA believes that 24 °C will be sufficiently protective of the balanced indigenous population of Mount Hope Bay for a number of reasons. See Chapter 6 of EPA’s July 22, 2002, Permit Determinations Document and other responses to comments in this document for more detailed information.

Response #: III.61	**Document #**: 1148

Comment
EPA adopted a critical threshold temperature of 5 °C in the wintertime based on the hatching success of winter flounder eggs. One commenter felt this value was not sufficiently protective.

Response
EPA believes that this temperature will be sufficiently protective of the balanced indigenous population in Mount Hope Bay. For more detail, see Chapter 6 of EPA’s July 22, 2002, Permit Determinations Document.

Response #: III.62	**Document #**: 1148

Comment
One commenter felt that the permit should be written so as not to allow the company to discharge at all (i.e., “zero discharge”).

Response
EPA believes that, consistent with CWA § 316(a), the limits in the Draft NPDES Permit are sufficiently stringent to assure the protection and propagation of the balanced indigenous population of Mount Hope Bay. Stricter permit limits do not appear warranted at this time, but this can be re-evaluated for future permits.

Response #: III.63	**Document #**: 1155, 1160

Comment
The National Marine Fisheries Service (NMFS) and the New England Fishery Management Council did not have any essential fish habitat recommendations pursuant to § 305(b)(4)(A) of the Magnuson-Stevens Fishery Conservation and Management Act beyond the requirements in the Draft Permit. However, if EPA were to weaken its discharge limits in issuing the Final Permit, NMFS and the New England Fishery Management Council would reinitiate the consultation process.

Response
The discharge limits in the Final Permit are virtually identical to those in the draft. Therefore, EPA believes that it has fulfilled its commitments under the Magnuson-Stevens Fishery Conservation and Management Act and no additional consultation on essential fish habitat is required.

Response #: III.64	**Document #**: 1159

Comment
One commenter suggested that there was an inconsistency in the permit on pages 19 and 20 with respect to whether the discharge temperature needs to be reduced to 90 °F or 95 °F in response to a fish kill.

Response
The commenter was correct in noting this inconsistency. This was an oversight and has been corrected in the Final Permit. When a thermally induced fish kill occurs, the permittee is required to reduce the discharge temperature to 90 °F.

Response #: III.65	**Document #**: 1159

Comment
One commenter sought clarification on the origin of the 0.16×10^{12} Btu/year figure used to calculate the number of hours that BPS is allowed to operate once-through cooling.

Response
The value of 0.16×10^{12} Btu/year appeared in a sample calculation in the fact sheet; however, this was a typographical error. The value actually used in the calculation was 0.9×10^{12} Btu/year.

Response #: III.66	**Document #**: 1176

Comment
One commenter stated that there is little evidence of a direct impact from BPS on winter flounder populations in Mount Hope Bay. Thermal impacts alone or in combination with other plant impacts do not seem strong enough to affect the distribution of winter flounder.

Response
EPA has substantial direct evidence that intake flow and thermal discharges at BPS are affecting winter flounder in Mount Hope Bay. PG&E-NEG has estimated the number of winter flounder larvae and eggs that are entrained through the facility. Based on prior experience, and in lieu of any credible contradictory information, EPA assumes that the eggs and larvae that pass through the facility do not survive. In addition, PG&E-NEG has provided data on the number of winter flounder that are impinged by the facility, although data are not available regarding the condition of these fish after impingement. Based on personal observations of fish in the wetwell at BPS, experience at other plants, and observations of sea birds feeding on fish exiting the fish return system, the long-term health and survival of impinged fish is

doubtful. Thus, EPA assumes 100 percent mortality for these as well. EPA also has compelling evidence of thermal impacts on winter flounder abundances. Satellite thermal images show that the thermal plume from BPS extends over the entire bay on the outgoing tide. It also shows that in the summer and fall Mount Hope Bay is 0.8 °C (1.5 °F) warmer than comparable waterbodies of similar depth. For more detailed information on the effects of thermal discharge on winter flounder, see responses elsewhere in this document.

Response #: III.67	**Document #**: 1211

Comment
One commenter stated that there is a clear correlation between increases in plant operations and declines in fish populations in Mount Hope Bay.

Response
There is no question that a significant increase in thermal rejection to the bay and increased intake flow at BPS correlate with reduced fish populations in Mount Hope Bay. This connection in time does not establish cause and effect in a strict scientific sense, but it is highly suggestive that, at a minimum, operations at BPS caused or contributed to the fishery's collapse. It should be noted that EPA has examined a number of other possible explanations for the collapse and has not found another set of factors more likely to explain the collapse than the increases in thermal discharge and intake flow at BPS.

Response #: III.68	**Document #**: 1036, 1037, 1038, 1039, 1042, 1056, 1062, 1066, 1074, 1075, 1077, 1086, 1225, 1053, 1070, 1071, 1137, 1211

Comment
EPA received 18 comments stating that the thermal discharge is having a detrimental effect on fish populations and the marine environment.

Response
EPA agrees that the thermal discharge is altering the natural temperature profile in Mount Hope Bay and increasing water temperatures above levels that scientific studies suggest would result in negative impacts on fish and other marine life. For a full discussion on the specific thermal effects, see Chapter 6 of EPA's July 22, 2002, Permit Determinations Document.

Response #'s: III.69	**Document #'s**: 1006, 1011, 1182

Comment
Several commenters, some referring to the transcripts of the CBS News broadcast on August 28 and 29, 2002, expressed concern that increased air emissions may contribute to the effect of global warming (1006) and that the proposed permit "may cause more problems than what already exists." And that "glacial warming and El Nino have resulted in changes in the ocean water temperatures and these changes are a hundred times more detrimental to the fish population in Mount Hope Bay than the effect of the Brayton Point Power Plant." (1011)

Response
It has been reasonably well established by several independent researchers (Oviatt 1994, MRI 2002) that water temperatures within Narragansett Bay and Mount Hope Bay have been increasing over the last 30-40 years. The cause of this trend has not been established as man-induced global warming or some natural long term climatic variation. In Mount Hope Bay, the effects of this warming are only further worsened by the thermal discharge of BPS. EPA has calculated that long-term temperature rise contributes an additional 0.0383 trillion Btu/year in heat; this compares with BPS's current permitted discharge, which

contributes up to 42 trillion Btu/year. Further, while air emissions from coal combustion at BPS may likely contribute to global warming conditions, this permit only addresses water pollution issues.

Response #'s: III.70	**Document #'s**: 1016

Comment
One commenter suggested that horticulture or floriculture processes could reuse the heat generated from the plant, and that the Department of Agriculture should be consulted in this regard.

Response
EPA recognizes that this could be a promising idea in some cases, but currently has no knowledge of any similar applications.

Response #'s: III.71	**Document #'s**: 1096

Comment
One commenter asked "what the elevated temperatures may be doing to other marine life and our environment?"

Response
EPA refers the reader to Chapter 6 of EPA's July 22, 2002, Permit Determinations Document for a discussion of thermal impacts on marine life.

Response #'s: III.72	**Document #'s**: 1155

Comment
One commenter supported the Draft Permit and indicates that EPA correctly identified the main issue of concern for minimizing impacts on essential fish habitat is the thermal discharge into the Bay.

Response
This comment has been noted. No further response is necessary.

Response #'s: III.73-82	**Document #'s**: 1132, 1133, 1150, 1175

73. Comment
Several commenters supported EPA's denial of the CWA § 316(a) variance requested by PG&E-NEG, which would have set thermal effluent limitations, including a 28 TBtu annual discharge limit, based on the performance capability predicted by PG&E-NEG of its preferred cooling technology, the so-called "Enhanced Multi-Mode" (EMM) cooling system. These commenters felt that PG&E-NEG had not adequately justified such a variance. (1133, 1150, 1175)

Response
EPA agrees with these comments. Thus, EPA did not grant the CWA § 316(a) variance-based thermal discharge limits sought by the permittee. EPA did, however, conclude that a different set of thermal discharge limits somewhat less stringent than the technology-based (BAT) limitations and water quality standards-based limitations that would otherwise have applied could satisfy the standards of CWA § 316(a). Therefore, the thermal discharge limitations we included in the Draft and Final Permits are based on a § 316(a) variance.

74. Comment
Many commenters indicated, either expressly or implicitly, that the evidence indicates that the BIP of aquatic organisms that ought to reside in Mount Hope Bay has been damaged and does not exist at

present. They also contended that this must be taken into account when evaluating the permittee's variance application. (1133, 1150, 1175).

Response

EPA agrees that the BIP that ought to reside in Mount Hope Bay does not exist at present. The current condition of aquatic populations and the ecosystem on which they depend is discussed in substantial detail in EPA's CWA NPDES Permit Determinations Document for Thermal Discharges and Cooling Water Intake from BPS in Somerset, MA (July 22, 2002) (EPA's July 22, 2002, Permit Determinations Document). It is also discussed further elsewhere in this document.

EPA also agrees that the current condition of the ecosystem and the BIP must be considered when assessing the proposed thermal discharge and a request for thermal discharge limits based on a CWA § 316(a) variance. This is true for a number of reasons. For example, consideration of the current condition of the BIP is necessary in evaluating a variance application presented on the theory that an existing thermal discharge has caused no "appreciable harm" to the BIP (i.e., a "retrospective" variance application). Furthermore, consideration of the current condition of the BIP is necessary in evaluating the degree of thermal discharge that can be permitted while still "assur[ing] the protection and propagation" of the BIP going forward (i.e., a "prospective" variance application). At the same time, it should be remembered that the BIP to be protected is not merely whatever community of organisms presently exists. Otherwise, a discharger could harm a community and then argue its discharge should be permitted because it is compatible with the now depleted population. This would be inconsistent with CWA § 316(a). See 40 CFR § 125.71(c). These issues are discussed in §§ 6.2.1, 6.2.2 and 6.2.3 of EPA's July 22, 2002, Permit Determinations Document.

75. Comment

One commenter pointed out that "[i]t is not the government's burden to demonstrate that BPS was the cause of the degradation of MHB." Rather, according to the commenter, it is PG&E-NEG's burden to show that its proposed variance would both assure the protection and propagation of the BIP and protect elements of the aquatic ecosystem essential for protection and propagation of the BIP–whether or not predators or other factors are contributing to the stress on the BIP. This commenter further stated that PG&E-NEG failed to meet this standard because (1) the data support the conclusion that past and existing BPS operations, including thermal discharges, have significantly contributed to the decline of the bay's fishery and degradation of water quality; (2) the company has underestimated the adverse effects of its past and existing operations as well as the effects that would result from future operations under its EMM-derived variance proposal; (3) discharges from the proposed EMM cooling system could cause fish avoidance and interfere with normal fish migration in the Mount Hope Bay estuary; (4) discharges from the proposed EMM cooling system would chronically violate numeric and narrative water quality standards in both Rhode Island and Massachusetts waters that are designed to protect habitat for fish and other aquatic life; (5) the permittee has not demonstrated that existing water quality and existing uses will be protected and maintained as required by the CWA and water quality standards; and (6) the data show that the permittee's proposal might contribute to further degradation. (#1133)

Response

EPA agrees that the discharger has the burden to "demonstrate to the satisfaction of the Administrator" that any effluent limitations it proposes pursuant to CWA § 316(a) will satisfy the biological standard of the statute (i.e., will assure the protection and propagation of the BIP). These legal issues are discussed in EPA's July 22, 2002, Permit Determinations Document in §§ 6.2.1, 6.2.2, and 6.2.3. Moreover, in this case, EPA has concluded that the permittee has not adequately carried this burden (i.e., it has not demonstrated to the satisfaction of EPA that its proposed thermal discharge limits will ensure the protection and propagation of the BIP). See *Id.*, Chapter 6. Having rejected the permittee's specific variance application, EPA did not, however, simply propose thermal Draft Permit limits based on technology-based or water quality-based limitations. Instead, EPA has proposed its own alternative thermal discharge limitations, which are less stringent than the technology-based and water quality-based conditions that would otherwise apply, but more stringent than those proposed by the permittee. See *Id*., at Chapters 6 and 8. EPA has concluded, from detailed analysis, that these thermal discharge limitations will be sufficient to assure the protection and propagation of the BIP, and has included these limits in the permit. EPA has the burden of demonstrating that these standards will meet the standards of CWA § 316(a). EPA believes it has done so in the July 22, 2002, Permit Determinations Document and in this document (and other supporting materials). EPA also believes that if the standards of CWA § 316(a) are met, the thermal discharge will not interfere with the attainment of the designated uses of Mount Hope Bay. These designated uses include providing high-quality fish habitat and a recreational fishing resource. EPA recognizes that some commenters have objected that the thermal discharge limits proposed by EPA under § 316(a) are not stringent enough, while others object that they are too stringent. These comments are addressed elsewhere in this document.

76. Comment

One commenter stated that EPA granted BPS's 1976 NPDES permit "contrary to the advice of all Federal and State biologists who were consulted on the matter" (citing AR 2040) and that EPA should not repeat this mistake. (1133)

Response

In addition to conducting its own biological analysis, EPA has considered the views and information offered by biologists and officials from numerous Federal and State resource agencies, including the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the MA DMF, the MA DEP (a co-permitting agency), the MA CZM, and the RI DEM. These agencies have uniformly agreed with the proposed permit conditions, with the exception that the U.S. Fish and Wildlife Service felt the conditions should be more stringent in certain respects. The U.S. Fish and Wildlife Service's concerns are addressed elsewhere in this document.

EPA has also considered the views and information offered by biologists retained by the company to offer comments on this permit. These comments have disagreed with the permit, finding it too stringent and questioning various aspects of EPA's biological analyses. These comments are addressed elsewhere.

EPA has also considered the views and information offered by biologists and other knowledgeable people from fishery management bodies (such as the New England Fisheries Management Council and the Atlantic State Marine Fisheries Management Council), environmental groups (such as the CLF, Save The Bay, Massachusetts Audubon, and others), and fishing organizations (such as the Rhode Island Salt Water Anglers Association, Rhode Island Inshore Trawler Fishing Association, and others). These organizations have largely supported the permit, though some have found it not stringent enough in certain respects. These issues are addressed elsewhere in this document.

EPA hopes that, by engaging in this lengthy and inclusive process, it will have improved its chances of avoiding a repeat of past permitting errors that may have occurred. Unfortunately, many of the critical issues related to this permit unavoidably involve a certain amount of scientific uncertainty. EPA cannot be 100 percent sure that the permit limits it is imposing will be sufficient to meet the applicable environmental standards and facilitate the restoration of the fishery. EPA also cannot be 100 percent sure that the permit limits it is imposing will not be more stringent than would have been sufficient to allow for the protection and propagation of the BIP. EPA has done its best, however, to conduct a reasonable and appropriate analysis considering all of the relevant information, to draw reasonable and appropriate conclusions from it, and to properly apply the standards of the CWA.

77. Comment
One commenter pointed out that based on the language of CWA § 316(a), the legislative history of this section, and governing regulations, cost or economic issues are not to be considered in determining whether to grant a variance from thermal discharge standards. CWA § 316(a) variance determinations are, instead, to be based on whether or not a discharge would meet the statutory requirement for protection and propagation of the BIP. (1133)

Response
EPA agrees with the commenter. EPA explained its view on this point in the July 22, 2002, Permit Determinations Document. See EPA § 6.2.2 of the document. This is discussed further elsewhere in this document.

78. Comment
One commenter agreed with EPA that under CWA § 316(a), EPA can grant variances from technology- and water quality-based standards, but the commenter stated that the magnitude of the thermal discharge allowed by EPA's Draft Permit may be excessive. The commenter stated that because EPA's proposed variance would allow BPS to exceed technology-based standards for maximum thermal discharge temperatures by more than 10 percent and for total heat load by more than 100 percent, and in light of "data [indicating] . . . that a number of fish populations have all but disappeared from Mount Hope Bay," it is uncertain that EPA's proposed limits would be sufficient to ensure the protection and propagation of a BIP, as required by § 316(a). (1132)

Response
As a logical matter, the degree to which the thermal discharge limits would exceed technology-based standards has no necessary relationship to whether or not those limits would be sufficient to assure the protection and propagation of the BIP. Technology-based standards for thermal discharge are based on the degree of effluent reduction achievable from use of the BAT economically achievable, as discussed in EPA's July 22, 2002, Permit Determinations Document. They are not based on what would or would not be adequate for protecting the BIP. In general, where technology-based limits would not be adequate to protect water quality standards (i.e., criteria and uses), more stringent water quality-based limitations would apply. When it comes to thermal discharges, the specific variance standards of CWA § 316(a) might also come into play.

With respect to the severely depressed status of fish populations in Mount Hope Bay, as discussed elsewhere in this document, these facts must be considered in the context of reaching conclusions under CWA § 316(a).

As discussed elsewhere in this document, EPA agrees with the commenter that the Agency cannot be completely certain that its proposed permit limits will be sufficient to assure protection and propagation of the BIP. Nevertheless, EPA concludes that the limits imposed are appropriate. As discussed in EPA's July 22, 2002, Permit Determinations Document, CWA § 316(a) imposes a stringent test for justifying the application of alternative thermal discharge limitations. See § 6.2.3 of the document. Moreover, as EPA has explained, "[t]he greater the risk, the greater the degree of certainty that should be required." (*Id.*, quoting *In re Public Service Company of New Hampshire*, 10 ERC at 1265) At the same time, however, absolute certainty is not required to support a variance and would be impossible to achieve in almost any case unless no thermal discharge was permitted whatsoever. EPA believes that it has conducted a reasonable and appropriate analysis in this case, taking into account the significant risk that applies to the BIP in Mount Hope Bay, given its apparently depleted status and the various stresses it faces. EPA also concludes that there is a reasonable and appropriate justification for concluding that the thermal discharge limits it has imposed under CWA § 316(a) will assure the protection and propagation of the BIP.

79. Comment
Several commenters requested that EPA mandate continued environmental monitoring of the plant's operations. (1132, 1133) One specifically called for more comprehensive requirements than proposed in the current Draft Permit. (1133) One commenter stated that detailed monitoring of plant operations is required to determine whether Final Permit conditions are adequately protecting the BIP. (1132) Another commenter wrote that any new NPDES permit for BPS should require BPS to monitor "thermal effects and water temperatures throughout the water column as well as other ecological indicators . . . to accurately reflect ecological conditions of the Bay on a continuing basis." (1133)

Response
EPA clearly has authority under the CWA to require reasonable monitoring requirements necessary to track the pertinent operations of the facility and to discern its effects on the marine environment. See, e.g., 33 U.S.C. §§ 1318, 1342(a)(2). The permit contains a variety of different types of monitoring requirements to track the various types of pollutants discharged by the facility (e.g., heat, chemicals), as well as to track the effects of the cooling water intake structures (e.g., entrainment and impingement data collection).

Despite the substantial reductions as compared with current operations, the facility will still have a relatively large volume discharge and withdrawal (39 MGD and 56 MGD, respectively). Therefore, monitoring is still needed. (To provide an indication of the relative magnitude of the discharge and withdrawal volumes even after the required reductions, EPA notes that a withdrawal of more than 50 MGD classifies a plant as a "large facility" under the proposed Phase II 316(b) regulations, and EPA generally classifies discharges of more than 1 MGD as "major dischargers." Furthermore, as a nearby point of comparison, the Fall River POTW has a permitted average monthly discharge of 31 MGD.)

EPA has tried to balance these competing factors to devise a monitoring program that provides necessary data to determine compliance with the permit and satisfaction of the applicable CWA standards, while also being fair to the permittee. The monitoring requirements are spelled out in detail in the Final Permit.

80. Comment
One commenter stated that given the inevitable uncertainty regarding whether the variance-based thermal discharge limits proposed by EPA in the Draft Permit are adequately protective, EPA should restore the "backstop" narrative thermal discharge conditions that were included in previous permits, including the existing permit, and that prohibit discharges that would, among other things, "degrade aquatic habitat quality." (1132)

Response
The "backstop" provision was needed in earlier permits due to uncertainty over future biological effects. EPA believes that the far more stringent thermal discharge limits in this permit are sufficient to assure the protection and propagation of the BIP, and thus satisfy CWA § 316(a), and are sufficient to prevent the degradation of aquatic habitat quality. Therefore, we have decided to omit the "backstop" narrative provision from the permit. If future information indicates otherwise, this can of course be reviewed in permit reissuance or modification proceedings.

81. Comment
One commenter stated that EPA's 316(a) analysis correctly "pinpoints" BPS as one of the "most likely causes" of fishery collapse, while properly taking other stressors into account. The commenter noted that because Mount Hope Bay's aquatic populations are subject to various significant stressors, EPA was correct to take a holistic approach and demand more of a reduction in thermal discharge to Mount Hope Bay than might be needed in an otherwise healthy habitat. (1132) Another commenter cited *In re Public Service Company of New Hampshire*, 10 ERC 1257, 1261 (June 17, 1977), in support of the conclusion

that EPA correctly considered whether or not the "incremental effects of the thermal discharge will . . . cause the aggregate of all relevant stresses (including entrainment and entrapment by the intake structure) to exceed the 316(a) threshold." (1133)

Response
EPA agrees that when assessing thermal discharge limitations under CWA § 316(a), it is necessary to consider cumulative impacts and to set thermal discharge limits necessary to assure the protection and propagation of the BIP taking other stressors into account. See EPA's July 22, 2002, Permit Determinations Document, § 6.2.2. EPA also has determined that operation of the BPS cooling system has likely contributed significantly to the decline of the Mount Hope Bay fishery. EPA's biological assessment is discussed further elsewhere in this document and in the record for the Draft Permit.

82. Comment
One commenter stated that there was a legal presumption against granting variances and, in light of this "presumption," requested that EPA explain more fully the scientific reasoning behind its determination that allowing a thermal discharge impact zone (in which exceedances of critical temperatures for fish would occur) that would cover 10 percent of the area of Mount Hope Bay would nevertheless be sufficient for the protection and propagation of the BIP. The commenter stated that this was particularly important considering that the area expected to be impacted by the plume includes shallow subtidal areas in the northern portion of the estuary, the preferred juvenile winter flounder habitat. The commenter further noted that technology-based standards would require a lesser thermal discharge. (1132)

Response
EPA agrees that technology-based standards would require more stringent thermal discharge limitations. EPA determined what such limitations would require in Chapter 4 of EPA's July 22, 2002, Permit Determinations Document. See also Chapter 8 of the document.

CWA § 316(a) expressly authorizes EPA to set variance-based—as opposed to technology-based or water quality-based—thermal discharge limitations if the rigorous standards of § 316(a) can be met. This is discussed in detail in § 6.2.3 of EPA's July 22, 2002, Permit Determinations Document. EPA has provided further explanation of the variance-based thermal discharge limits elsewhere in this document.

Response #'s: III.83	**Document #'s**: 1133

Comment
One commenter stated that cost and other economic considerations are not, as a legal matter, to be considered under CWA § 316(a).

Response
EPA agrees with this comment, as discussed in Chapter 6 of the July 22, 2002, Permit Determinations Document and elsewhere in this document.

IV. CWA § 316(b)-Based Cooling Water Intake Limits

Response #: IV.1-44	**Document #**: 1218

1. Comment
The permittee disagreed with EPA's view that CWA § 316(b) authorizes EPA to regulate the volume and rate (velocity) of cooling water flow taken in through the cooling water intake structure. The permittee stated that § 316(b) authorizes EPA to regulate the "location, design, construction, and capacity" of "cooling water intake structures," not changes in flow or other operational parameters. The permittee stated that EPA "may not, through creative misreading of a single word ("capacity"), assert regulatory control over other aspects of plant operations where Congress chose not to grant such authority." In support of its claim, the permittee cited its own comments and the Utility Water Action Group's (UWAG) comments on the Phase II § 316(b) proposed rule.

Response
As a preliminary matter, EPA is not required to respond to comments on the proposed § 316(b) rulemaking that are cited by the permittee. This is especially the case where the permittee has referred only generally to these other comments and has not provided any specific references. See *NRDC* v. *EPA*, 863 F.2d 1420, fn. 7 (9th Cir. 1988) (upholding EPA's decision not to consider comments pertaining to national rulemaking because "requiring each EPA Region to consider all the comments relating to the national rulemaking in each BPJ permit would impose an unreasonable burden on the agency."); *Mount Diablo Hosp.* v. *Shalala*, 3 F. 3d 1226 (9th Cir. 1993) ("there is no obligation to make reference in the agency explanation to all the specific issues raised in comments. The agency's explanation must simply enable a reviewing court to see what major issues of policy were ventilated by the informal proceedings and why the agency reacted to them the way it did") (citing *South Carolina ex rel. Tindal* v. *Block*, 717 F.2d 874, 886 (4th Cir. 1983) (internal citations and quotations omitted), cert. denied, 465 U.S. 1080, 79 L. Ed. 2d 764, 104 S. Ct.1444 (1984)). EPA has, nonetheless, reviewed the comments submitted by BPS and UWAG on the proposed § 316(b) rulemaking and responded below to those points that are relevant to the interpretation of the term "capacity" as used in CWA § 316(b).

EPA disagrees with the permittee's assertion that CWA § 316(b) does not authorize EPA to regulate a CWIS's rate of flow. As explained in § 7.2.8d of the July 22, 2002, Permit Determinations Document, EPA has long interpreted the term "capacity" in § 316(b) to refer to the volume of cooling water drawn through the intake. The velocity of the water drawn into the plant may also be considered under this factor. See July 22, 2002, Permit Determinations Document, § 7.2.8d. EPA's interpretation is based upon the commonly understood meaning of the term "capacity," the legislative history of the CWA Amendments of 1972, the definition of the term in EPA's proposed regulations under CWA § 316(b) from 1976, and opinions issued both by the Administrator and the General Counsel of EPA. See *id*.

In addition, in the preamble to EPA's final rule for cooling water intake structures at new facilities (66 FR 65256, December 18, 2001, codified at 40 CFR Part 125, Subpart I), EPA discussed its authority under section 316(b) of the CWA to regulate the "capacity" of a cooling water intake structure, including its rate of intake. Specifically, EPA stated that

> "[r]educing the cooling water intake structure's capacity is one of the most effective means of reducing entrainment (and impingement). Capacity includes the **volume of water** that can be withdrawn through a cooling water intake structure over a period of time. Limiting the volume of the water withdrawn from a waterbody typically reduces the

> number of aquatic organisms in that waterbody that otherwise would be entrained." 66 FR at 65273 (emphasis added).

The permittee's claim that "capacity" refers only to the intake structure itself—i.e., the velocity at the intake—and not to the volume of water withdrawn makes little sense, as the capacity of a CWIS (**including** the velocity at the intake) necessarily affects the amount of water it can take in. In any event, EPA's long-standing interpretation of the statute is certainly reasonable.

The permittee's claim (in comments on the proposed § 316(b) rule) that EPA cites references from legislative history that have nothing to do with the § 316(b) debate is incorrect. As discussed in the July 22, 2002, Permit Determinations Document, in *Decision of the General Counsel No. 41*, at 200-01, EPA's General Counsel explained the bases for his conclusion that "capacity" as used in CWA § 316(b) refers to the volume of cooling water drawn through the intake. In addition to language from the decision cited in § 7.2.8d of the July 22, 2002, Permit Determinations Document, EPA's General Counsel cited extensively to the Legislative History of § 316(b), stating:

> In the course of debating the conference report of the Act on October 4, 1972, the Senate was well aware of the dangers posed to aquatic life by the withdrawal of large volumes of water through cooling water intake structures [footnote omitted]. In response to concerns voiced by Senator Buckley that the Act would prevent the effective regulation of this problem, Senator Muskie, the Chairman of the Senate Conference Committee, stated that EPA had authority under the Act to regulate the withdrawal of cooling water so as to minimize adverse environmental aspects.

Decision of the General Counsel No. 41 (In re Brunswick Steam Electric Plant), 200–201 (June 1, 1976) (citing Senate Com. on Pub. Works. A Legislative History of the Water Pollution Control Act Amendments of 1972, 93d Cong., 1st Session, at 197–198 (1973)). Furthermore, in a footnote, the General Counsel noted that:

> [d]uring debate, Senator Buckley cited—with approval—two newspaper articles which reported a decision of the Atomic Energy Commission (AEC) to require Consolidated Edison Company to install a closed cycle cooling system at its nuclear power plants at Indian Point on the Hudson River. The articles pointed out that plants withdrew massive amounts of water from the River and, as a result, also withdrew thousands of aquatic organisms each minute. In order to minimize this adverse environmental impact, the articles noted that the AEC had ordered Consolidated Edison Company to stop removing such large volumes of water from the River and to install cooling towers in order to do so.

Id. (citing Senate Com. on Pub. Works, A Legislative History of the Water Pollution Control Act Amendments of 1972, 93d Cong., 1st Session, at 196–197 [1973]).

EPA has also long disagreed with the assertion, made by UWAG in its comments on EPA's recently proposed § 316(b) regulations, that "capacity" should refer **only** to the velocity of withdrawal at the intake. As EPA's General Counsel explained in *Decision of the General Counsel No. 41*:

> ... it does not make sense to define the term "capacity" in terms of the physical size of the inlet opening of the intake structure as urged by [the permittee]. First, as noted by [the permittee], the size of the inlet determines only the velocity of the water withdrawn, not the volume. Although velocity (and volume) is an important factor in the impingement of larger fish, velocity is not important with respect to the entrainment of smaller organisms.

> Rather, the volume withdrawn is the principal determinant of entrainment damage which is the major adverse environmental effect associated with most cooling intake structures.

Id. (citing 41 FR 17388 (April 26, 1976) (Final CWA § 316(b) regulations later withdrawn by EPA after remand by Federal court on procedural grounds)).

EPA also disagrees with the claim, presented by UWAG in its comments on the recently proposed § 316(b) regulations, that the CWA's preservation of State authority over the use of their water resources indicates that Congress did not intend EPA to regulate the use of cooling water flow or volume (citing CWA § 101(b), (g), 33 U.S.C. § 1251(b), (g)). This argument ignores the plain requirements of § 316(b), as well as the legislative history of the provision and EPA's longstanding interpretation of it. Furthermore, this argument posits a conflict between § 316(b) and State authority under § 101(b) and (g) where none exists.

EPA has discussed above why the language of § 316(b) and its legislative history, consistent with EPA's longstanding interpretation of the statute, indicate that the volume of water withdrawn through cooling water intake structures may be regulated by EPA under § 316(b). That discussion will not be repeated here. It is also evident that there is no conflict with State authority over water resources as a result of EPA's interpretation. EPA's interpretation of § 316(b) no more creates a conflict with this State authority than do the unassailable interpretations of the CWA that recognize EPA authority to regulate discharges of pollutants. Indeed, EPA's interpretation of § 316(b) **furthers** State authority to manage water resources: by limiting the volume of water withdrawn by a cooling water intake structure, EPA would cause more water, unadulterated by pollution, and more of the living organisms that inhabit that water to remain in the waterbody subject to State decisions regarding water use than if EPA took the position that it had no authority to regulate cooling water withdrawal volumes. This is because when a power plant withdraws water through its cooling water intake structure, some of that water evaporates to the air, the water is heated and typically has chemicals added to it, and much of the marine life in the water is killed or injured. In other words, by limiting the amount of water a power plant takes through a cooling water intake structure, EPA would, if anything, tend to support, rather than interfere with, a State's ability to allocate water use. (In any event, certainly no such conflict between Federal and State authority exists here with respect to BPS and both Massachusetts and Rhode Island support the permit's § 316(b) limits.)

Moreover, EPA believes that its interpretation of § 316(b)—which enables the Agency to try to minimize the adverse environmental impacts of cooling water intake structures, as Congress clearly wanted EPA to do—is fully consistent with the overarching statutory purposes expressed in CWA § 101. As discussed in § 7.2.1 of the July 22, 2002, Permit Determinations Document, CWA § 316(b), like other provisions of the statute, should be construed with Congress' ambitious overarching statutory purposes in mind: i.e., to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters," and to attain "water quality which provides for the protection and propagation of fish, shellfish, and wildlife." 33 U.S.C. § 1251(a), (a)(2). EPA's reading of § 316(b) is consistent with these goals, whereas the contrary interpretation offered by UWAG would cut against these goals.

2. Comment

The permittee stated that to ensure decisional consistency and fairness, Region 1 should not finalize this permit until EPA headquarters finalizes the pending § 316(b) rulemaking. The permittee stated that EPA headquarters has expressed an intention to codify "its historic rejection of closed-cycle cooling as BTA for existing power plants and allow existing plants choices among technologies and mitigation measures." The permittee stated that if EPA issues the permit now and requires closed-cycle cooling, BPS will be forever deprived of the opportunity to pursue the options afforded by the new regulations—a result that is disfavored by the courts. Citing *NRDC* v. *EPA*, 863 F.2d 1420, 1427 (9th Cir. 1988) and language from EPA's 1984 NPDES rulemaking (49 Fed. Reg. 37,998, 38,019, 38,020), the permittee asserted that guidelines should be applied equally to all dischargers and not penalize or create a competitive disadvantage for companies that had received a BPJ permit before guidelines promulgation**.**

Response
EPA disagrees with the permittee's position. EPA explained its views on this point in the July 22, 2002, Permit Determinations Document and in letters to the permittee and other documents in the Administrative Record, which EPA hereby incorporates by reference into these responses to comments. These materials include §§ 7.2.3 and 7.2.4 of EPA's July 22, 2002, Permit Determinations Document and AR 3021, 3022, 3023, 3024, 3025, 3027, and 3080. EPA notes that it has been issuing BPJ permits under § 316(b) for decades and numerous power plants utilize wet mechanical draft cooling towers for closed-cycle cooling.

3. Comment
The permittee stated that the pending § 316(b) rule "would codify EPA's prior practice" and that Region 1 is therefore "not free to single-handedly overrule prior precedent and establish closed-cycle cooling as the new baseline for all existing facilities." The permittee questioned whether Region 1 could distinguish this case on its facts, since "the preferred alternative identified in the Headquarters draft rule would clearly apply to BPS." The permittee stated that in light of this pending national rule and "principles of decisional consistency," it questioned EPA's ability to justify imposition of closed-cycle cooling as required by "40 CFR 125(c)(2)(i)"**.** The permittee stated that while it is "aware that the proposed rule states that it is not intended to be binding, this does not necessarily decide the issue." The permittee stated that EPA's ability to justify imposition of closed-cycle cooling on BPS and "principles of decisional consistency" were in serious doubt as a matter of law.

Response
EPA disagrees with this comment. EPA explained its views on this point in the July 22, 2002, Permit Determinations Document and in letters to the permittee and other documents in the Administrative Record, which EPA hereby incorporates by reference into these responses to comments. These materials include §§ 7.2.3 and 7.2.4 of EPA's July 22, 2002, Permit Determinations Document and AR 3021, 3022, 3023, 3024, 3025, 3027, and 3080. Furthermore, EPA has not purported to set a "new baseline for all existing facilities." EPA has engaged in a case-by-case, BPJ application of CWA § 316(b) to BPS consistent with the law and applicable precedent.

In addition, the permittee's regulatory citation does not support its argument. Assuming the permittee intended to refer in its comment to 40 CFR § 125.3(c)(2)—since there is no "40 CFR 125(c)(2)(i)" as referenced by the permittee—that section applies to technology-based **effluent** limits, not to BTA determinations for cooling water intake structures under § 316(b) of the Act.

4. Comment
The permittee stated that in many respects, the analyses Region 1 must do to determine BTA overlap with the analyses it must do to determine BAT. Therefore, the permittee stated, it incorporated by reference its critique of Region 1's technological assessment and cost calculations into its comments on the 316(b) aspect of the Draft Permit.

Response
EPA agrees that the analyses necessary to determine BTA overlap in many respects with the analyses necessary to determine BAT. Therefore, EPA has cross-referenced a number of responses that are germane to both. There are, however, important distinctions between the BTA and BAT analyses. In addition, satisfaction of the § 316(a) burden does not necessarily mean intake requirements under § 316(b) have also been met. EPA explained the interaction between CWA §§ 316(b) and 316(a) analyses

in § 7.2.6 of the July 22, 2002, Permit Determinations Document. See also EPA's response to comments on the BAT standard.

5. Comment
The permittee stated that EPA has disregarded its obligation under "40 CFR § 125(c)(2)(i)" to consider, in addition to the specific circumstances of each individual case, the appropriate national standard for the industrial class to which the individual facility belongs in making BTA determinations. The permittee stated that there is no legal or biological support for demanding that an existing facility be retrofitted with closed-cycle cooling towers in order to meet the BTA requirement. The permittee further stated that the results of EPA's application of the BTA standard over the past 30 years have been "uniform," demonstrating consistent rejection of closed-cycle cooling as too costly and unjustified in light of the potential environmental benefits (citing, e.g., *In Re Florida Power Corporation, Crystal River Power Plant*, at p. 7 (U.S. EPA Region 4, September 1, 1988)). The permittee also stated that EPA Headquarters has instructed the regional offices to consider past permitting decisions in making BTA determinations (citing Dec. 28, 2000, memo from Michael Cook to Regional Directors). Therefore, the permittee stated, EPA bears a heavy burden to justify its decision to impose closed-cycle cooling in this case (citing *Motor Vehicle Manuf. Ass'n* v. *State Farm*, 463 U.S. 29, 41-42 (1983); *Massachusetts Dep't of Education* v. *U.S. Dep't of Education*, 837 F. 2d 536, 544-45 (1st Cir. 1988)).

Response
EPA disagrees. First, the permittee's regulatory citation does not support its argument. Assuming the permittee intended to refer in its comment to 40 CFR § 125.3(c)(2)—since there is no "40 CFR 125(c)(2)(i)" as referenced by the permittee—that section applies to technology-based **effluent** limits, not to BTA determinations for cooling water intake structures under § 316(b) of the Act. Second, as explained in EPA's July 22, 2002, Permit Determinations Document, EPA has not yet promulgated regulations specifying national technology guidelines for CWISs at existing facilities. In the absence of such regulations, EPA has been applying, and continues to apply, CWA § 316(b) on a case-by-case, BPJ basis. See July 22, 2002, Permit Determinations Document, §§ 7.2.4, 7.2.5; AR 2026. Accordingly, EPA has thoroughly considered the circumstances of this case and has explained the bases for its BTA determination in Chapter 7 of the July 22, 2002, Permit Determinations Document. This is consistent with Agency directives and past permit decisions.

EPA agrees with the petitioner that the Agency should consider past permitting decisions in making BTA determinations. See July 22, 2002, Permit Determinations Document, § 7.2.4. The Agency believes, however, that its analysis and decision are consistent with EPA's past case-by-case, BPJ approach to developing CWA § 316(b) limits for individual permits. It must be understood that under a case-by-case analysis, while the same standards are applied, the details of the analysis and the final resolutions could differ for different cases based on the different facts of each case. This is the essence of case-by-case, BPJ analysis. See, e.g., *Hudson Riverkeeper Fund, Inc.* v. *Orange and Rockland Utilities, Inc.*, 835 F. Supp. 160, 166 (S.D.N.Y. 1993) (noting that plants existing within view of one another on the same river could potentially be issued permits with "markedly different" BTA requirements under the case-by-case application of CWA § 316(b)); *American Petroleum Institute* v. *Environmental Protection Agency*, 787 F. 2d 965, 969 (5th Cir. 1986) (stating that "[w]here EPA has not promulgated applicable technology-based effluent limitations guidelines, the permits must incorporate, on a case-by-case method, 'such conditions as the Administrator determines are necessary to carry out the provisions of the Act'" (citing 33 U.S.C. § 1342(a)(1))). EPA's determination in the present case is consistent with this long-standing interpretation of the BTA standard under CWA § 316(b).

Beyond the fact of case-by-case analysis, EPA does not agree that the results of its application of the BTA standard over the past 30 years have been "uniform" in rejecting closed-cycle cooling. In fact, EPA has never rejected closed-cycle cooling as potentially representing BTA for some facilities. Indeed, in the past

EPA has established NPDES permit limits that would have required facilities to retrofit to closed-cycle cooling. For example, EPA issued a permit in 1974 to the Carolina Power & Light Co. ("CP&L") establishing CWIS flow limits that would have required CP&L to retrofit the Brunswick power plant with a closed-cycle cooling system. *In the Matter of Carolina Power and Light Company (Brunswick Steam Electric Plant - Units 1 and 2) (National Pollutant Discharge Elimination System Permit No. NC 0007064)* (Decision by EPA Region 4) (November 7, 1977). (AR 3111). See also James R. May, *The Quick and the Dead: Fish Entrainment, Entrapment, and the Implementation and Application of Section 316(b) of the Clean Water Act*, 20 VT. L. REV. 373, 408 (1995). Closed-cycle cooling was expected to reduce the environmental impacts of the plant by 96 percent, see *Id*. at 412, and the cooling towers were projected to cost $106 million. See *Id.* at n. 229. The utility appealed, and EPA Region 4 responded by issuing an Initial Decision in 1977 which upheld the permit and would have forced CP&L to retrofit its existing once-through system with closed-cycle cooling. See *Id.* at 408. On further appeal in 1978, the EPA Administrator remanded the Initial Decision to the Region on procedural grounds. See *Id.* at 412 (citing *In re Carolina Power & Light Co.*, Appeal No. 77-19, 1978 EPA App LEXIS 4, at 2-3 (EPA Feb. 20, 1978)). In response, the Regional Administrator for Region 4 simply reconfirmed his earlier decision. See *Id.* at 413. Then in 1980, the dispute was settled under a new Regional Administrator, resolving the dispute without requiring the installation of cooling towers. See *Id.* EPA did not, however, invalidate its earlier analysis or reject the possibility of cooling towers being BTA in some other case. Cf. *Consolidated Edison Co. of N.Y., Inc.* v. *New York State Dep't of Envtl. Conservation*, 726 F. Supp. 1404, 1406 (S.D.N.Y. 1989) (Draft Permits issued by EPA in 1975 to three utilities established thermal discharge limits that would require retrofits to closed-cycle cooling towers, though settlement of a permit appeal did not result in the installation of cooling towers).

In the case of the Crystal River power plant, it appears that a similar path was followed. AR 2143 (*In Re Florida Power Corporation, Crystal River Power Plant*, U.S. EPA Region 4 (September 1, 1988)). In a 1974 Draft Permit, it appears the Region required closed-cycle cooling ("offstream cooling"), pending acceptance of a subsequent § 316(a) variance request. *Id.* at p. 2. After a hearing and further study, EPA finally determined that **in that case** the cost of installing cooling towers would be wholly disproportionate to the benefits. *Id.* at p. 7. The final determination ultimately required seasonal flow reductions and various environmental mitigation efforts. *Id.* at p. 8. This was a determination for that specific facility and did not suggest that closed-cycle cooling could not represent BTA for some other plant.

In addition, EPA provided a detailed analysis of its interpretation of CWA §316(b) in *In re Public Service Company of New Hampshire (Seabrook Station, Units 1 and 2)*, 10 ERC 1257 (NPDES Permit Application No. NH 0020338, Case No. 76-7; June 10, 1977). See July 22, 2002, Permit Determinations Document, § 7.2.5e. Although the EPA Administrator ultimately did not require the Seabrook Station to retrofit to closed-cycle cooling, the language of the *Seabrook* decision indicates that EPA embraced closed-cycle cooling as an option under CWA § 316(b). Indeed, the Administrator points to the possibility of requiring closed-cycle cooling under CWA § 316(b) to emphasize the importance of reading the wholly disproportionate cost test into CWA § 316(b) determinations. "Otherwise," the Administrator noted, "the effect would be to require cooling towers at every plant that could afford to install them, regardless of whether any significant degree of entrainment or entrapment was anticipated." *Id.* at 1261.

EPA believes it is clear from these past permitting decisions that EPA has **not** rejected closed-cycle cooling as an "available" technology and potentially the BTA for some facilities under CWA § 316(b), any more than EPA has mandated closed-cycle cooling for all facilities. EPA has, instead, left the determination to a case-by-case analysis.

Finally, EPA disagrees with the permittee's assertion that the Agency bears a heavy burden to justify its CWIS flow limits in this case. In support of its assertion, the permittee cites two judicial cases that are not on point. In *Motor Vehicle Manuf. Ass'n* v. *State Farm*, the petitioners challenged the National Highway Traffic Safety Administration's rescission of a rule as arbitrary and capricious because the agency had not adequately explained the rescission. See 463 U.S. 29(1983). The Supreme Court remanded the matter for further agency consideration, holding that under the Administrative Procedure Act, "an agency changing its course by rescinding a rule is obligated to supply a reasoned analysis for the change...." *Id*. at 42. The present case does not concern the establishment or rescission of a rule nor a change in course by the Agency. Rather, at issue here is EPA's application of § 316(b) on a case-by-case BPJ basis in the **absence of** governing regulations. Such an application of § 316(b) is entirely consistent with EPA's past practices. See July 22, 2002, Permit Determinations Document, §§ 7.2.4, 7.2.5. In *Massachusetts Dep't of Education* v. *U.S. Dep't of Education*, the petitioner challenged an order issued by the Department of Education as contrary to an earlier decision by the Education Appeals Board. See 837 F.2d.536 (1st Cir. 1988). The First Circuit recognized that "when an agency fills a quasi-judicial role, it builds a body of precedent which it cannot thereafter lightly disregard." *Id*. at 544. The court affirmed the agency's order, however, finding that the agency had appropriately distinguished the earlier EAB decision and that its interpretation of the statutory language was supportable. See *id*. at 545-46. This case is inapposite to the present situation. Again, as discussed in the July 22, 2002, Permit Determinations Document, EPA's application of the BTA standard in the present case is clearly consistent with the Agency's longstanding interpretation of § 316(b), and the resulting BTA determination in this particular case is justified by the case-specific analyses EPA has carried out. See *Id.*

From a biological standpoint, BPS annually entrains and impinges large quantities of fish and invertebrate eggs, larvae, juveniles, and adults. It was not possible to put these substantial losses in context for most species. However, EPA derived an estimate of the population of winter flounder in Mount Hope Bay and compared plant impingement and entrainment losses to this estimate. This calculation showed that a substantial percentage of the winter flounder population of Mount Hope Bay was being lost to the intake structure at BPS. This is occurring at a time when the winter flounder population in Mount Hope Bay is at a historical low point as are the other species also subjected to large entrainment losses. Closed-cycle cooling would not completely eliminate the impact of the facility's intake but would substantially reduce it and potentially allow for recovery of the balanced, indigenous community in Mount Hope Bay.

6. Comment

The permittee stated that Region 1 has "plainly failed" to justify the necessity or achievability of closed-cycle cooling and that "EPA is not entitled to invent new biological, economic or legal analyses when it is dissatisfied with the results that the traditional methods yield." The permittee stated that Region 1 is also not entitled "to recycle scientific methods that EPA itself has, in other proceedings, rejected as lacking in validity in hopes that the inconsistency will not be noticed." The permittee further stated that even Region 1's own application of "accepted methods" demonstrates that a retrofit to closed-cycle cooling cannot be justified.

Response

As explained in § 7.7.4 of the July 22, 2002, Permit Determinations Document, EPA has determined that CWIS **capacity limitations** based on the Closed-Cycle Entire Station option are necessary to reflect BTA for minimizing adverse environmental impacts. Accordingly, EPA imposed a performance standard for CWIS flow which BPS may meet in any manner it chooses. See July 22, 2002, Permit Determinations Document, §§ 7.7.2, 7.7.4. In addition, EPA has determined that closed-cycle cooling is an "available" technology at BPS under § 316(b), meaning it is both technologically feasible and economically practicable. See July 22, 2002, Permit Determinations Document, Chapter 7.

The permittee asserted that EPA cannot "invent" new biological, economic, or legal analyses to support its determinations because it is "dissatisfied with the results that the traditional methods yield." Yet, EPA has not done so in this case. It is unclear what "traditional methods" or "invented methods" the permittee is referring to. There are no express legal requirements governing EPA's selection of scientific or economic methods in applying § 316(b). Furthermore, EPA's analyses for this permit are reasonable and appropriate. Indeed, they are far more detailed than those conducted for other individual § 316(b) permits. EPA's approaches for this permit are closer to the types of detailed analyses that the permittee demands than other less sophisticated analyses undertaken for past permits. Courts have upheld EPA's choice of scientific models and calculation methodologies where the Agency's selection bears a "rational relationship" to the characteristics of the data to which it is applied. See *Nat'l Wildlife Fed'n* v. *EPA*, 286 F.3d 554, 565 (D.C. Cir. 2002) ("We may reject an agency's choice of a scientific model 'only when the model bears no rational relationship to the characteristics of the data to which it is applied.' ") (quoting *Appalachian Power Co.* v. *EPA*, 135 F.3d 791, 802 (D.C. Cir. 1998) [citing *Am. Iron & Steel Inst.* v. *EPA*, 115 F.3d 979, 1005 (D.C. Cir. 1997)); *Chem. Mfrs. Ass'n* v. *EPA*, 28 F.3d 1259, 1265 (D.C. Cir. 1994)); cf. *Am. Forest & Paper Ass'n, Inc.*, 294 F.3d 113, 121 (D.C. Cir. 2002) (applying "rational relationship" standard and upholding EPA's reasoned preference for one methodology of calculating safe exposure levels over alternative methodology).

In addition, to the extent the permittee's general assertion that EPA has "invented" new methods of analysis is in reference to EPA's evaluation of benefits (see July 22, 2002, Permit Determinations Document, § 7.6.3b), EPA did not invent new methods. EPA's per-person analysis, as previously explained, was a benefits transfer assessment based on a past analysis in the literature. The HRC analysis was not used to value benefits **per se**, and it was derived, as previously explained, from the Habitat Equivalency Approach used in natural resource damages cases. Furthermore, EPA made improvements to its benefits analyses in response to comments, and these, too, are consistent with concepts from the literature (i.e., they were not "invented" by EPA just for this permit). Moreover, even if the approaches had been developed by EPA for this permit, that does not by itself render them unacceptable if they have been shown to be reasonable and appropriate for use in this context. Finally, contrary to the permittee's suggestion, the approaches EPA has used here have not been rejected by EPA in other proceedings.

In addition, contrary to the permittee's assertion, EPA's analysis in the July 22, 2002, Permit Determinations Document demonstrates that a retrofit to closed-cycle cooling is feasible at BPS. See July 22, 2002, Permit Determinations Document, Chapter 7.

EPA has responded in more detail to the permittee's specific challenges to EPA's biological, economic, and legal analyses elsewhere in this document.

7. Comment

The permittee stated that Region 1's decision to require closed-cycle cooling on all four units at BPS and to impose a thermal discharge limit of 1.7 TBtus is not justified by its decision document or by the Administrative Record. The permittee stated that Region 1 does not "even attempt to explain how its imposition of closed-cycle cooling is either consistent with prior precedent or a reasoned departure from it." The permittee further stated that Region 1 failed to present a "reasoned response" to the analyses submitted by BPS, had determined the outcome of this matter before BPS even submitted its demonstration, and demonstrated an "unwillingness" to use the best available evidence and to accept the answers that "sound science" requires. The result, the permittee stated, is a Draft Permit that would impose unprecedented costs on BPS "without any compelling evidence that those costs will make any meaningful difference to the environment."

Response

EPA disagrees. EPA has explained in detail the bases for its determinations in the July 22, 2002, Permit Determinations Document, elsewhere in this response to comments, and in other documents that are part of the Administrative Record. As discussed elsewhere, the Agency's decision in this case-by-case, BPJ permit determination is not a departure from past precedent.

Furthermore, EPA has not prejudged the results of this permit. EPA has been working on these issues since 1997, when the two MOAs were agreed to by the permittee and the regulatory agencies. The existing permit expired in 1998. EPA has been working with the permittee and others to evaluate these issues objectively and clearly has not rushed this permit out precipitously or without careful study. Moreover, as noted in a March 18, 2003, EPA memorandum (AR 3022), EPA has held off on issuing the permit, despite the permittee's delays in submitting necessary information, in order to thoroughly consider information submitted late by the permittee. For example, despite the fact that a permit application was due from BPS in January 1998, the permittee did not submit its complete CWA §§ 316(a) and (b) demonstration documents until December 2001. Although the prior owners of BPS, the New England Power Company (NEPCO), had submitted a permit application in January 1998, this application did not fully address the CWA §§ 316(a) and (b) issues. Indeed, NEPCO had indicated that it would be seeking a State water quality standards mixing zone-based permit for the thermal discharges, but it was not until much later that PG&E-NEG shifted to requesting thermal discharge limits based on a CWA § 316(a) variance. In addition, EPA had to make repeated requests to try to obtain certain information from the permittee that the Agency believed would help it develop the best possible permit. Nevertheless, the Agency did not expedite issuance of the Draft Permit by disregarding the permittee's late variance request or by refusing to review the belated § 316(a) and (b) demonstration documents or other delayed submissions of information. EPA believes the time taken has been necessary to allow for careful information gathering, analysis, and consideration of all the relevant issues. Had the Agency predetermined the requirements in this permit, it would not have allowed for these repeated delays or engage in such prolonged study.

8. Comment

The permittee stated that it is not appropriate to consider the use of a technology at a new power plant as justifying its use at an existing power plant. The permittee stated that "[a]s EPA has recognized in its promulgation of 316(b) regulations, existing sources face numerous constraints in retrofitting technology and the appropriate technology for a new source is unlikely to be the same as the technology that is appropriate for an existing source" (citing 67 FR 17,123, 17,155 (April 9, 2002)).

Response

EPA's determination that retrofitting closed-cycle cooling constitutes BTA at BPS under CWA §316(b) does not depend solely upon the use of closed-cycle cooling at new power plants. Rather, as discussed in § 7.2.5 of EPA's July 22, 2002, Permit Determinations Document, EPA's CWA § 316(b) determination was based upon consideration of (1) the best-performing CWISs at **existing** power plants, which are these that have undergone cooling system retrofits, and (2) the feasibility of a retrofit to closed-cycle cooling at BPS given the particular facts of the BPS situation. EPA has identified a number of existing fossil fuel-burning power plants that have undergone technological retrofits from open-cycle to closed-cycle cooling systems using wet mechanical draft cooling towers. These plants have achieved the best performance in terms of minimizing adverse environmental impacts from their CWISs. See 67 FR 17,123, 17,155 (April 9, 2002). As discussed elsewhere in these responses to comments, since issuance of the Draft Permit, EPA has also learned of additional existing power plants that either have retrofitted or are planning to retrofit from open-cycle to closed-cycle cooling. In addition, as explained in Chapter 7 of the July 22, 2002, Permit Determinations Document and elsewhere in this document, EPA's site-specific analysis has demonstrated that a retrofit from once-through to closed-cycle cooling is both technologically feasible and economically practicable at BPS. The Agency does not believe any significant comments have been submitted that undermine this conclusion.

Second, while EPA has acknowledged in the preamble to the proposed § 316(b) Phase II regulations that existing sources face numerous constraints in retrofitting technology, these general constraints are not determinative in any particular case. The question for this permit is what BPS **in particular** is capable of achieving. EPA has considered the issues related to retrofitting closed-cycle cooling at existing facilities and has determined that such a retrofit is practicable at BPS. As discussed throughout Chapter 7 of EPA's July 22, 2002, Permit Determinations Document, in the absence of regulations specifying national technology guidelines for existing CWISs, EPA has been applying and continues to apply CWA § 316(b) on a case-by-case, BPJ basis. EPA headquarters has stated that the Agency retains the discretion to adopt approaches on a case-by-case basis that differ from applicable guidance where appropriate and that any decisions on a particular facility should be based on the requirements of § 316(b). See July 22, 2002, Permit Determinations Document, § 7.2.4. See also *Hudson Riverkeeper Fund, Inc.* v. *Orange and Rockland Utilities, Inc.*, 835 F. Supp. 160, 166 (S.D.N.Y. 1993) (noting that plants existing within view of one another on the same river may be issued permits with "markedly different" BTA requirements under CWA § 316(b)); *American Petroleum Institute* v. *Environmental Protection Agency*, 787 F. 2d 965, 969 (5th Cir. 1986) (stating that "[w]here EPA has not promulgated applicable technology-based effluent limitations guidelines, the permits must incorporate, on a case-by-case method, 'such conditions as the Administrator determines are necessary to carry out the provisions of the Act'" (citing 33 U.S.C. § 1342(a)(1))).

Moreover, the proposed § 316(b) Phase II rule is not a promulgated rule. Rather, it is a **proposal** upon which EPA is currently making changes. The preamble to the proposed rule explicitly states that it is **not** to be used as guidance. Even if it were to be used as guidance, EPA would retain the reasonable discretion to adopt a contrary approach based on the particular facts in this case, in order to carry out the requirements of CWA § 316(b). This is because guidance does not have the force of law, as the permittee has pointed out in its comments.

9. Comment
The permittee stated that it does not believe that any level of impact, no matter how small, constitutes adverse environmental impact. Rather, the permittee stated, adverse impact "should be determined on the basis of significant, population-level effects on affected species." (The permittee cites to its comments to EPA headquarters on the proposed § 316(b) regulations in support of this comment.)

Response
As discussed elsewhere in this document, EPA is not required to respond to comments on the proposed 316(b) rulemaking that are cited by the permittee. EPA has, nonetheless, reviewed the comments submitted by BPS on the proposed § 316(b) rulemaking and responded in the discussion below to those points that are relevant to the definition of "adverse environmental impact."

In § 7.2.5c of EPA's July 22, 2002, Permit Determination Document, the Agency clearly explains how it interprets the term "adverse environmental impact (AEI)," the basis for this interpretation, and its reasons for rejecting the permittee's proposal to limit adverse environmental impact only to cases of demonstrated "significant, population-level effects." While the statute does not define "adverse environmental impact," EPA's interpretation is reasonable and is consistent with the legislative history and past Agency interpretations and guidance. In a 1977 guidance document, EPA stated that it was critical to evaluate the "magnitude of any adverse impact" and that "[t]he magnitude of an adverse impact should be estimated both in terms of short term and long term impact" with reference to the following factors: (1) "absolute damage," (2) "percentage damage," (3) absolute and percentage damage to any endangered species, (4) absolute and percentage damage to any "critical aquatic organism," (5) absolute and percentage damage to commercially valuable and/or sport fisheries yield, and (6) "whether the impact would endanger (jeopardize) the protection and propagation of a balanced population of shellfish and fish in and on the body of water from which the cooling water is withdrawn (long-term impact)." The article cited by the permittee also notes that EPA has indicated that even losses from entrainment or impingement of **individual organisms** by themselves constitutes an adverse environmental impact. See [Permits Division, Office of Water Enforcement, EPA, Guidance for Evaluating the Adverse Impact of Cooling Water Intake

Structures on the Aquatic Environment: § 316(b), P.L. 92-500 (1977) (Draft); Deborah G. Nagle & James T. Morgan, A Draft Regulatory Framework for Analyzing Potential Adverse Environmental Impacts from Cooling Water Intake Structures 1 (undated) (EPA predecisional position paper issued during CWA § 316(b) Phase II rulemaking)). Thus, the guidance document indicates that in assessing the magnitude of the adverse effect, EPA is to consider both the number of individual organisms killed or injured (i.e., "absolute damage") and the percentage of the overall population of species that are damaged (i.e., "percentage damage"). It is also clear that "percentage damage" should be considered at levels below that which would cause the complete collapse of the population. In other words, consideration of "percentage damage" is not limited to cases of 100 percent damage.

EPA Region I has also acknowledged that there may be some **de minimis** threshold level of impacts below which the Agency will not consider adverse environmental impact to have occurred. The impacts in this case, however, are far beyond any concept of **de minimis** effects. EPA also has never set a standard that would ignore impacts beneath the level of "substantial harm to populations of biota." See July 22, 2002, Permit Determinations Document, § 7.2.5c. Instead, EPA has interpreted the § 316(b) technology standard to require minimization of adverse environmental impacts, whether or not they are "significant," as long as the wholly disproportionate cost test is satisfied. See July 22, 2002, Permit Determinations Document, §§ 7.2.5c, 7.2.5d. In any event, the impacts in this case clearly **are** significant.

Moreover, the permittee's additional assertion that "significant population effects" must be "demonstrated" in order for AEI to exist also has no support in the statutory language, the legislative history, case law, or EPA guidance. See *Id.* Such a limitation would contravene the purpose of § 316(b) by authorizing EPA to regulate CWISs only where substantial damage had already been caused. This is also clearly incorrect in light of both the purpose of CWA § 316(b) and EPA guidance documents discussing the need to assess **potential** future entrainment and impingement effects, whether from new or existing facilities. See *Id.* at fn. 16. Once again, however, EPA believes that the data show that significant population effects are occurring as a result of the cooling water intake.

In the context of case-by-case, BPJ permitting, adverse environmental impact should be assessed on a case-by-case basis, taking into account the facts related to the ecosystem and natural resources in question. See July 22, 2002, Permit Determinations Document, § 7.2.5c. The appropriate technology for "minimizing" these adverse impacts is determined based on an assessment of the "available" technologies and whether the cost of attaining these additional reductions would be wholly disproportionate to the benefits. See July 22, 2002, Permit Determinations Document, § 7.2.5d.

EPA disagrees with the permittee's assertion (in comments on the proposed § 316(b) rule) that a requirement of population-level impacts under § 316(b) may be derived from the interaction between §§ 316(a) and (b). The assertion contradicts the plain language of the two provisions and has no support in the legislative history, case law, or EPA guidance. As discussed in § 7.2.6 of the July 22, 2002, Permit Determinations Document, CWA § 316(a) addresses thermal **discharges**, while CWA § 316(b) addresses the adverse environmental impacts of the operation of CWISs. As EPA stated in the preamble to the 1976 Proposed Final CWA 316(b) Regulations, "[t]he concerns of the two sections are different and the legal standards by which compliance with their requirements is to be judged are similarly distinct." 41 Fed. Reg. 17389 (April 26, 1976) (Final CWA § 316(b) regulations later withdrawn by EPA after remand by Federal court on procedural). That is, CWA § 316(b) BTA requirements are not excused even if the adverse environmental impacts from the CWIS would not be so severe as to preclude the protection and propagation of the source waterbody's balanced indigenous population of fish, shellfish, and wildlife. Under the wholly disproportionate cost test, however, the less serious the adverse impacts, the less significant the costs that would be justified to reduce those impacts. See July 22, 2002, Permit Determinations Document, § 7.2.6.

10. Comment
The permittee stated that EPA's evaluation of the technological options contains numerous errors. Specifically, the permittee stated, EPA ignored detailed information concerning the impacts of various technologies and chose to rely on "speculative and unsupported statements to evaluate the possible impacts of the different technologies." The permittee stated that EPA's "conclusory rejection of the aesthetic and safety impacts of the thermal plume" and noise impacts of cooling towers are "uninformed" and "demonstrably incorrect."

Response
EPA did not ignore information concerning the potential environmental impacts of the various technological options (e.g., cooling towers) for meeting new CWA § 316(b) standards. EPA's consideration of these issues was neither "speculative", "unsupported", nor conclusory. It was also was neither "uninformed" nor "demonstrably incorrect." EPA's analysis was based on appropriate research, empirical observations, and consideration of the permittee's CWA § 316(b) Demonstration Document (December 2001). In addition, EPA has carefully considered the comments submitted on these issues by the permittee and others, such as the Town of Somerset. In response to these comments, EPA has conducted analyses on these issues, such as potential noise impacts and potential cooling tower vapor plumes. EPA's responses to comments on these issues, including our updated analyses, are presented in more detail elsewhere in this document. The Agency continues to conclude that these issues can be properly managed and controlled. Moreover, EPA concludes that the permittee has overstated the potential adverse effects of cooling towers in its submissions.

11. Comment
The permittee disagreed with EPA's statement that the closed-cycle entire station option is the only option under which the entrainment and impingement of organisms by the plant's cooling water intake structure would not interfere with satisfaction of Massachusetts and Rhode Island water quality standards. The permittee also stated that EPA identifies no prior case in which compliance with State water quality standards has been considered a requirement under § 316(b) and that EPA "misstates the role of 'affected State's water quality standards."

Response
EPA has concluded that a NPDES permit's requirements pertaining to CWISs under CWA § 316(b) must not only comply with EPA technology standard determinations but also with any more stringent, applicable State legal requirements, including water quality standards. See CWA §§ 401, 301(b)(1)(C); 40 CFR § 122.44(d)(5). The Agency's legal analysis of this issue is presented elsewhere in this document and will not be repeated here. EPA notes, however, that the Region's conclusion on this point is also consistent with EPA's legal interpretation evidenced in 40 CFR § 125.84(e) of the Phase I CWA § 316(b) regulations. EPA also acknowledges that some small changes probably could be made without running afoul of State water quality standards but has concluded that any **significant** increase to intake flow would be inconsistent with both Massachusetts' and Rhode Island's water quality standards and therefore unacceptable. The Agency believes its conclusions are supported by the CWA § 401(a)(1) certification letter from the Commonwealth of Massachusetts, dated September 24, 2003 and the letter from the State of Rhode Island under CWA § 401(a)(2) (AR 3013), dated September 18, 2002.

In addition, as discussed in more detail elsewhere in this document and in § 5.2 of EPA's July 22, 2002, Permit Determinations Document, EPA has properly interpreted and applied the requirements of CWA § 401(a)(2) in the context of this permit. This provision authorizes a "downstream affected state" to object to a NPDES permit based on its effect on the State's water quality standards. The State is not, however, given either a certification role or veto authority over that permit. Nevertheless, the statute plainly dictates that EPA must "condition such license or permit in such manner as may be necessary to insure compliance with applicable water quality requirements [in the downstream affected state]." CWA §

401(a)(2). See also 40 CFR § 122.44(d)(4) (NPDES permits must include conditions that "[c]onform to applicable water quality requirements under § 401(a)(2) of CWA when the discharge affects a State other than the certifying State").

Economic Considerations:

12. Comment
The permittee commented that EPA has improperly assessed the benefits and costs of the CWA § 316(b)-based permit limitations included in the Draft Permit, while certain other commenters have supported EPA's assessment of the costs and benefits or argued that the Agency underestimated the benefits.

Response
A. Introduction

EPA disagrees with the permittee. The Agency believes that in developing the CWA § 316(b)-based limitations for the Draft Permit, it conducted a reasonable and appropriate assessment and consideration of the estimated benefits and costs of these permit limits, and that it properly applied the "wholly disproportionate cost test" applicable under § 316(b). EPA's evaluation of these issues is set forth in substantial detail in Chapter 7 of EPA's CWA NPDES Permit Determinations for Thermal Discharge and Cooling Water Intake from BPS in Somerset, MA (July 22, 2002) (EPA's July 22, 2002, Permit Determinations Document) and various supporting documents from the administrative record.

Although EPA believes its consideration of benefits and costs under CWA § 316(b) was more than adequate, the Agency has made certain improvements to its analysis in response to the public comments EPA received on the Draft Permit. The Agency's updated consideration of benefit and cost issues is discussed both here and in other responses to comments included in this document, as well as in a series of independent analyses presented in memoranda by EPA's expert consultants. These memoranda have, in turn, been independently reviewed by EPA, and the Agency is adopting them and incorporating them herein by reference.

As explained elsewhere, cost and benefit estimation and the weighing of costs against benefits are **not** proper considerations in setting permit limitations under CWA § 316(a) or in ensuring compliance with State water quality standards. Furthermore, as also explained elsewhere, under CWA §§ 301 and 304, cost-benefit balancing is not required in setting BAT limitations for effluent discharges, such as thermal discharges, though costs must be considered.

Under CWA § 316(b), however, some consideration and balancing of benefits and costs **is** required under EPA's interpretation of the statute. In § 7.2.5e of EPA's July 22, 2002, Permit Determinations Document, EPA explained how these considerations apply under CWA § 316(b).

B. Economic Practicability

EPA indicated in § 7.2.5e of its July 22, 2002, Permit Determinations Document that cost should initially be considered from the standpoint of economic practicability. EPA has undertaken such a consideration and concluded, as discussed elsewhere in this document and at § 7.7.4b of EPA's July 22, 2002, Permit Determinations Document, that the costs of complying with the CWA § 316(b)-based requirements of the permit **are** economically practicable for BPS. Indeed, no significant comment was provided to the contrary during the public comment period. While a range of views was expressed over the ramifications that any shutdown of BPS might have—these include the significant financial concerns that were expressed by Town of Somerset officials in this regard—no significant comments were provided indicating that the costs of complying with the permit's CWA § 316(b) requirements (even assuming the company's cost estimates) were economically impracticable for BPS.

EPA has revisited the issue of economic practicability for the Final Permit in light of both our revised cost estimates and the permittee's revised cost estimates included in its comments on the Draft Permit. On the basis of this review, EPA continues to conclude that the costs of compliance are economically practicable for BPS. Part of the support for EPA's conclusions on this issue is found in the memorandum from Michael Fisher, Abt Associates, Inc., to Mark Stein, Damien Houlihan, EPA Region 1; Shari Goodwin, Tetra Tech, Inc., "Financial Impact of Closed Cycle System Installation at BPS" (August 12, 2003) (the "August 12, 2003, Financial Impact Report")[1];

C. Consideration of Benefits and Costs—The Wholly Disproportionate Cost Test

EPA also explained in § 7.2.5e of the July 22, 2002, Permit Determinations Document that the costs and benefits of complying with BTA-based requirements under CWA § 316(b) must be assessed in order to apply the "wholly disproportionate cost test" as interpreted by the Agency. Thus, EPA will base cooling water intake permit limits on the capabilities of the BTA for minimizing (i.e., reducing as much as possible) adverse environmental impacts (such as entrainment and impingement impacts), except where the costs would be "wholly disproportionate" to the benefits of doing so, in which case the limits would be made accordingly less stringent.

EPA has long been clear that, consistent with the plain language of the statute, § 316(b) does not require that a precise or detailed cost-benefit analysis be prepared or considered. In adopting the wholly disproportionate cost-to-benefits test, EPA only interpreted the statute to authorize "some consideration" of costs. In the preamble to the Final CWA § 316(b) regulations issued in 1976, EPA stated the following:

> No comparison of monetary costs with the social benefits of minimizing adverse environmental impacts, much less a formal, quantified "cost-benefit" assessment, is required by the terms of Act. The statute directs the Agency to insure that enumerated aspects of cooling water intake structures reflect the best technology available for minimizing adverse environmental impacts. Once such adverse effects have been identified (or, in the case of new structures, predicted) then the effort must be to select the most effective means of minimizing (i.e., "reducing to the smallest possible amount or degree") those adverse effects.... The brief legislative history of § 316(b) states that the term "best technology available" contemplates the best technology available commercially at an economically practicable cost. As with the statute, this language does not require a formal or informal "cost-benefit" assessment. Rather, the term "available commercially at an economically practicable cost" reflects a Congressional concern that the application of "best technology available" should not impose an impracticable and unbearable economic burden on the operation of any plant subject to § 316(b).

[1] **Please note:** While this memorandum is part of EPA's administrative record, it is not presently included in the publicly available record because some of the analysis contained therein relies on information that the permittee has designated as CBI, and EPA's initial (and current) view is that some of this CBI could possibly be revealed if this memorandum were publicly released. The Agency can, of course, release this memorandum to the permittee if it is requested, since the memorandum involves the permittee's claimed CBI. If other members of the public ask to review the memorandum, the Agency will reevaluate whether it believes the CBI might be revealed by the memorandum and, if the Agency concludes it would not be, EPA would release the document after following the required procedures. Otherwise, the Agency would release the memorandum after redacting any portions that might reveal the CBI or trying to otherwise share the contents of the memorandum in a manner that would not reveal any claimed CBI. Beyond that, any party could request a copy of the memorandum pursuant to the FOIA, at which point EPA would follow the applicable legal procedures regarding claimed CBI and FOIA requests. See 40 CFR Part 2, Subpart B.

41 Fed. Reg. 17388 (April 26, 1976) (Final CWA § 316[b] regulations later withdrawn by EPA after remand by federal court on procedural grounds). In a subsequent permit appeal decision, the Administrator of EPA explained:

> ... the Agency's position, that cost-benefit analysis is not required under § 316(b), is correct. Section 316(b) provides flatly that cooling water intakes shall "reflect the best technology available for minimizing adverse environmental impact." Unlike §§ 301 and 304 [related to effluent discharges], § 316(b) determines what the benefits to be achieved are and directs the Agency to require use of "best technology available" to achieve them. There is nothing in § 316(b) indicating that a cost-benefit analysis should be done, whereas with regard to "best practicable control technology currently available" ... Congress added express qualifiers to the law indicating a requirement for cost-benefit analysis. Indeed, but for one bit of legislative history [citation to Representative Clausen's above-quoted remarks omitted], there would be no indication that Congress intended costs to be considered under § 316(b) at all. I find, therefore, that insofar as the RA's decision may have implied the requirement of a cost-benefit analysis under § 316(b), it was incorrect.
>
> However, the RA may have meant only that some consideration ought to be given to costs in determining the degree of minimization to be required. I agree that this is so—otherwise the effect would be to require cooling towers at every plant that could afford to install them, regardless of whether any significant degree or entrainment or entrapment was anticipated. I do not believe that it is reasonable to interpret § 316(b) as requiring the use of technology whose cost is wholly disproportionate to the environmental benefit to be gained.

In re Public Service Company of New Hampshire (Seabrook Station, Units 1 and 2), 10 ERC 1257, 1261 (NPDES Permit Application No. NH 0020338, Case No. 76-7; June 17, 1977) (Decision of the Administrator). In *Seacoast Anti-Pollution League* v. *Costle*, 597 F.2d 306, 311 (1st Cir., 1979), the First Circuit Court of Appeals noted EPA's application of the "wholly disproportionate cost" test with approval.[2]

Thus, EPA's present conclusion that no strict, formal, or precise cost-benefit analysis is required to support the development of CWA § 316(b) permit limits for the BPS NPDES permit is legally sound and consistent with Agency precedent. Nothing in the CWA, its legislative history, EPA regulations, or case law suggests otherwise. Nevertheless, based on EPA's statutory interpretation discussed above, the Agency must give "some consideration" to costs in determining whether the cost of BTA for minimizing adverse environmental impacts from a cooling water intake structure is wholly disproportionate to its benefits.

No statutory or regulatory provisions or guidance memoranda direct exactly how to apply this test under CWA § 316(b). Thus, the Agency has discretion to apply it in a rational manner. While the application of this test should be reasonably consistent across different cases, there is also room for reasonable variation between the analyses conducted in different cases given that the test is not strictly formulated and is applied on a case-by-case basis. Further, some variation is likely given that many factors are potentially

[2] In *Decision of the General Counsel No. 63 (In re Central Hudson Gas and Electric Corp.)* (July 29, 1977), p. 382, EPA's General Counsel reiterated EPA's "wholly disproportionate cost" test, citing to the *Seabrook* decision and underscoring that "this test is a limited one, for the Administrator ... rejected the notion that a full cost-benefit analysis is required under § 316(b)."

relevant, but different ones may be applicable to different cases. Differences in available data and other factors also may alter what constitutes a reasonable analysis in different cases.

For **general** guidance in applying the wholly disproportionate cost test for the Draft Permit, EPA looked, by analogy, to the Agency's application of the identically phrased test in the development of Best Practicable Treatment (BPT) effluent discharge limitations. EPA continues to believe this is a sensible and reasonable approach. The legislative history and case law both make clear that under the BPT "wholly disproportionate cost" test, cost-benefit balancing is to be of a "limited" nature and cost is not to be considered a factor of "primary" or "paramount" importance. If this is the case for developing BPT standards, where a degree of cost-benefit balancing **is** expressly required by the statute, see 33 U.S.C. § 1314(b)(1)(B), then costs should also not be a primary or paramount factor in applying the "wholly disproportionate cost" test under § 316(b), which does not even mention cost considerations. The courts have also stated that when applying the BPT "wholly disproportionate cost" test, EPA's balancing of costs and benefits "is a relatively subsidiary task and need not be precise" and that a reasonable estimate of costs and benefits is sufficient. *Eli Lilly and Company* v. *Costle,* 598 F.2d 638, 656-57 (1st Cir., 1979). See also *Weyerhaeuser Company* v. *Costle*, 590 F.2d 1011, 1049 (D.C. Cir., 1978). The courts have also upheld an "overall" cost-benefit comparison and rejected arguments that EPA must do an "incremental" cost-benefit analysis, *Weyerhaeuser,* 590 F.2d at 1047-48, n. 55, or a "knee of the curve" analysis. *Chemical Manuf. Ass'n* v. *U.S. EPA*, 870 F.2d 177, 203-07 (5th Cir., 1989).

As the courts have noted, one of the reasons that Congress did not require a more precise form of economic analysis in setting effluent discharge standards under the CWA is the impossibility of fully quantifying all the environmental benefits to be obtained from making technological improvements to reduce pollutant discharges. See, e.g., *Pacific Fisheries*, 615 F.2d at 809; *Appalachian Power Company* v. *Train*, 545 F.2d 1351, 1361 (4th Cir., 1977); *American Iron and Steel Institute* v. *EPA*, 526 F.2d 1027, 1075 (3d Cir., 1975). It is equally impossible to fully quantify economically all the benefits of minimizing the adverse environmental impacts of cooling water intake structures, and, therefore, it is similarly appropriate not to require a precise cost-benefit analysis when setting limits under CWA § 316(b). See also EPA's July 22, 2002, Permit Determinations Document, § 7.6.3a.

The courts have also been clear that in developing national standards under the BPT "wholly disproportionate cost" test, environmental controls might be required that would cause some "economic dislocation" and even plant closures to achieve the stated environmental objective. Thus, application of the "wholly disproportionate cost" test under the BPT standards confirms that application of the similar test under § 316(b) could potentially countenance significant economic impacts to a facility—at least up to the point of economic impracticability—if the costs would not be wholly disproportionate to the benefits.

Finally, the courts have also been clear in the context of BPT standards that EPA has broad discretion in deciding exactly how to evaluate benefits and costs and in determining the point at which costs become "wholly disproportionate" to benefits. See, e.g., *Chemical Manuf.*, 870 F.2d at 207 ("'The selection of the point of diminishing returns is a matter for agency determination.'" [citation omitted]); *Eli Lilly*, 598 F.2d at 656–57; *American Iron & Steel Institute* v. *EPA*, 568 F.2d 284, 297 (3d Cir. 1977). The courts have ruled that they should defer to EPA's decisions applying the wholly disproportionate test unless they are "not reasonable" or are "arbitrary and capricious." *Chemical Manuf.*, 870 F.2d at 206, 207. See also *Association of Pacific Fisheries* v. *EPA*, 615 F. 2d 794, 809 (9th Cir. 1980) (court review should ensure that decision is the "product of reasoned decision-making, adequately supported by information available to the Agency"). The notion that EPA would have significant discretion within the bounds of reasoned decision-making to weigh the benefits and costs and determine when the wholly disproportionate cost test has been violated is consistent with the principle that the numeric results of these types of economic analyses should **not** be regarded as strictly determinative or the sole determinants of policy decisions to the exclusion of other relevant factors. See, generally, Kenneth J. Arrow, et. al., “Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?” in *Economics of the Environment: Selected Readings* (Robert N. Stavins, Ed., 4th ed. 2000), p. 321–23; *Guidelines for Preparing Economic Analyses*, United States EPA (EPA 240-R-00-003) (September 2000), § 10.4.[3]

These principles apply equally to the application and review of the application of the wholly disproportionate cost test under CWA § 316(b).

D. Assessment of Benefits and Costs

Above, EPA discusses the role of benefit and cost considerations in applying CWA § 316(b) and, specifically, the “wholly disproportionate cost” (to benefits) test. Below, the Agency discusses its benefit and cost estimates, as well as the estimates presented in the permittee’s comments. Further below, EPA discusses its conclusions regarding application of the wholly disproportionate cost test. Benefits are discussed before costs, although the order of discussion is unimportant.

Initially, it is important to remember that the cost and benefit estimates developed by EPA **and** the permittee are just that, **estimates**. They unavoidably involve predictions, assumptions, and modeling analyses related to uncertain facts and future conditions and the inter-relationships between these uncertainties. On the cost side of the equation, for example, estimates of efficiency and auxiliary energy losses, as well as avoided load loss gains, depend on many uncertain factors, such as future energy prices. On the benefit side, for example, monetized estimates leave out any value for many likely benefits of intake improvements, such as reduced harms to invertebrates and associated improvements related to thermal discharge reductions. Moreover, they also rely on benefits transfer approaches (i.e., utilizing results from studies in other cases) to support an estimate of nonuse values in the present case.

The CWA does not, of course, require a precise assessment of benefits and costs under § 316(b) for this permit development. Uncertainties in this realm are unavoidable given the nature of the reasonably available data and methods. That being said,EPA has undertaken a more than reasonable effort to assess the benefits and costs for this permit. The Agency looked at the costs and benefits from a number of different perspectives using sound methods and producing reasonable estimates and explained these analyses in substantial detail. Indeed, EPA may have engaged in a more detailed, sophisticated assessment of benefits and costs than EPA has ever undertaken for the § 316(b) conditions for an individual NPDES permit. This work has been difficult, time-consuming, and expensive. These

[3] On several occasions, the permittee has cited EPA’s *Guidelines for Preparing Economic Analyses*, United States EPA (EPA 240-R-00-003) (September 2000) and stated that the analysis supporting the Region’s permit is inconsistent with the Guidelines, arguing or implying that the analysis is, therefore, unacceptable. There are several points to be made in response to these arguments. First, the Guidelines are a guidance document that does not create binding legal requirements on the Agency that are enforceable by third parties against the Agency or **vice versa**. See *Id.* at Title Page (“Notice: ... This document is not intended, nor can it be relied upon, to create any rights enforceable by any party in litigation with the United States. The Agency may decide to follow the guidance provided in this document, or to act at variance with the guidance based on its analysis of the specific facts present.”). Second, the Guidelines were prepared for use by the Agency in connection with the development of regulations and Agency policies, not individual permits. See *Id.* at Preface, p. i. Third, the Region believes that its analyses **are**, in fact, consistent with the Guidelines. Moreover, the Guidelines expressly state that they “do not provide a rigid blueprint or a ‘cook-book’ for all policy assessments ... [and that t]he most productive and illuminating approaches for particular situations will depend on a variety of case-specific factors and will require professional judgment to apply.” *Id.* at p. 2. The Guidelines also recognize that the choices made on how to approach the economic analysis issues in a given situation will necessarily be influenced by factors such as the nature of the issues present, the relevant statutory requirements, the availability of data, the cost and time needed to obtain data, and the need for expedition in taking regulatory actions. *Id.* at pp. 3, 5 (n. 2), 59, 64.

unfortunate by-products of more sophisticated analysis are, of course, compounded to some extent by the fact that complex analyses tend to prompt more complex comments which, in turn, take more time to consider and address. EPA has been mindful of the expenditure of public resources required to undertake this work, as well as the fact that this NPDES permit is long overdue (the current permit "expired" in July 1998) and the power plant continues to damage the ecosystem of Mount Hope Bay in the meantime. Nevertheless, EPA believes that the issues raised by this permit are extremely significant for the public and its natural resources as well as for the permittee. Therefore, the Agency has taken the time needed to conduct an analysis that is more than reasonable and appropriate under the applicable legal framework.

EPA would not necessarily repeat an analysis of this depth and detail for many other permits, but EPA thinks it appropriate for the Agency to tailor the scope and type of analyses undertaken for case-by-case § 316(b) permit determinations to match the importance and type of issues presented. The analysis the Agency conducted here was warranted by the facts of the case.

1. Benefits Assessments

There are three principal types of measures for assessing the environmental benefits of a regulatory action that will produce environmental improvements: quantitative/non-monetary, qualitative, and monetary. Each is valid, depending on the applicable legal requirements, as long as one understands what the measure does and does not represent, and what its limitations are.[4] EPA has tried to look at benefits from all three perspectives in developing CWA § 316(b) limits on a case-by-case basis for the BPS NPDES permit.

When setting technology standards-based effluent guidelines, EPA, consistent with CWA requirements, considers both costs and nonmonetary quantitative and qualitative measures of benefits, such as pounds of pollutants removed from an industry's waste stream. See *Chemical Manuf.*, 870 F. 2d at 207; *Weyerhauser*, 590 F. 2d at 1047. Under the requirements of Executive Order 12866 pertaining to regulation and policy development, EPA also considers benefits from both monetary and qualitative standpoints.

When it comes to applying CWA § 316(b)'s wholly disproportionate cost test for an individual permit development, neither statute, regulation, nor guidance memorandum dictates how benefits should be assessed. For the Draft Permit, EPA reviewed a number of past Agency decisions under § 316(b) for any relevant guidance. At the same time, the Agency recognized that there is room for reasonable variation between the analyses conducted in different cases given that the test is not strictly prescribed, is intended to be applied on a case-by-case basis, and different facts, issues, and data in different cases may reasonably prompt different analyses. In response to comments by the permittee expressing concern over whether the analysis for the BPS permit varies from other analyses, EPA has looked again at past decisions, while continuing to recognize that complete analytical uniformity is not necessarily required. From this review, EPA has not found any cases in which the Agency estimated monetized benefits when applying the wholly disproportionate cost test in the development of CWA § 316(b)-based permit limitations.

In the *Seabrook* case, mentioned above, it does not appear that EPA monetized estimated benefits. In the permit appeal decision, the Administrator ruled:

> ... the Agency's position, that cost-benefit analysis is not required under § 316(b), is correct. § 316(b) provides flatly that cooling water intakes shall 'reflect the best

[4] See, e.g., *Economic Guidelines*, § 10.4 (benefits that can be quantified but not monetized or only qualitatively assessed are often present).

> technology available for minimizing adverse environmental impact.' Unlike §§ 301 and 304 [related to effluent discharges], § 316(b) determines what the benefits to be achieved are and directs the Agency to require use of "best technology available" to achieve them.... [T]he RA may have meant only that some consideration ought to be given to costs in determining the degree of minimization to be required. I agree that this is so—otherwise the effect would be to require cooling towers at every plant that could afford to install them, regardless of whether any significant degree of entrainment or entrapment was anticipated. I do not believe that it is reasonable to interpret § 316(b) as requiring the use of technology whose cost is wholly disproportionate to the environmental benefit to be gained.

In re Public Service Company of New Hampshire (Seabrook Station, Units 1 and 2), 10 ERC 1257, 1261 (NPDES Permit Application No. NH 0020338, Case No. 76-7; June 17, 1977) (Decision of the Administrator). This discussion seems to indicate that consideration of benefits could focus solely on the amount of entrainment or impingement (i.e., "entrapment") reduction benefits that an option would achieve to determine if the option's costs would be wholly disproportionate to its benefits. Consistent with that, EPA apparently reached the common sense conclusion that where the facility was going to spend a lot of money to move the intake out of an estuary to an off-shore location, and where the environmental benefits of two alternative off-shore locations were similar but the cost of one option was substantially more than the other option, the cost of moving to the more expensive site would be wholly disproportionate to the benefits of doing so. The assessment of the benefits was based on the biological analysis and was either qualitative or quantitative/non-monetary in nature. See *In re Public Service Company of New Hampshire (Seabrook Station, Units 1 and 2) National Pollutant Discharge Elimination System permit* (Application No. NH 0020338, Case No. 76-7; August 4, 1978) (Administrator's Decision on Remand), 1 E.A.D. 455, 1978 WL 21140 (EPA), at p. 21. See also *Seacoast Anti-Pollution League* v. *Costle*, 597 F.2d 306 (1st Cir., 1979).

In *Decision of the General Counsel No. 63 (In re Central Hudson Gas and Electric Corp.)* (July 29, 1977), EPA's General Counsel stated that:

> ... EPA must ultimately demonstrate that the present value of the cumulative annual cost of modifications to cooling water intake structures is not wholly out of proportion to the magnitude of the estimated environmental gains (including attainment of the objectives of the Act and § 316(b)) to be derived from the modifications.

This formulation clearly does not direct that benefits be monetized. Instead, it specifies that when assessing benefits consideration be given to the objectives of § 316(b) and the CWA generally. The objectives of the Act include restoring and maintaining the physical and biological integrity of the nation's waters; achieving, wherever attainable, water quality that provides for the protection and propagation of fish, shellfish and wildlife; and providing for recreation, in and on the water. See 33 U.S.C. §§ 1251(a) and (a)(2). The objective of § 316(b) is to use the BTA to minimize the adverse environmental effects of cooling water intake structures, which include entrainment and impingement. As with *Seabrook*, this discussion suggests that the consideration of benefits should focus on biological/environmental considerations, which could involve qualitative and quantitative/nonmonetary measures.

A similar approach was taken in the initial permit appeal decision of *In the Matter of Carolina Power and Light Company (Brunswick Steam Electric Plant, Units 1 and 2)* (National Pollutant Discharge Elimination System Permit No. NC 0007064) (Decision by EPA Region IV) (November 7, 1977). (AR 3111) In this case, EPA Region 4 concluded that BTA for the facility was to reduce cooling water intake structure capacity based on the capability of adding cooling towers and that the cost of doing so was "not wholly disproportionate to a 96 percent reduction in the severe adverse environmental impacts of the plant." *Id.* at p. 69. The adverse impacts assessed by the Region included significant entrainment and impingement damage. *Id.* at pp. 33–44. Again, this was a quantitative/nonmonetary and qualitative assessment of benefits.[5]

In the case of *In the Matter of Florida Power Corporation, Crystal River Power Plant, Units 1, 2 and 3, Citrus County, Florida* (Findings and Determinations Pursuant to 33 U.S.C. § 1326; NPDES Permit No. FL 0000159) (September 1, 1988) (AR 2143), EPA also applied the wholly disproportionate cost test under CWA § 316(b). Here Region 4 seems to have engaged in a nonmonetized quantitative and qualitative assessment of benefits. We have found no indication that monetized benefits estimates were prepared. The Region concluded that the power plant's intake was causing "significant adverse biological effects." *Id.* at pp. 5–7. The region issued a Draft Permit requiring capacity reductions that would have been consistent with the use of closed-cycle cooling towers. *Id.* at p. 6 (¶ 3). For its Final Permit, however, the Region concluded that "installation of cooling towers would reduce entrainment damage by about 85 percent, however, the increased cost (about $150 million more that [sic] the system proposed by FPC) is considered wholly disproportionate to the environmental benefits to be derived." *Id.* at p. 7 (¶ 6). The Region's decision document provides no mention of or reference to any further assessment of benefits. In the end, due to the lack of other practicable technological approaches for minimizing adverse impacts to an acceptable level, the Region concluded that the degree of minimization achievable by a seasonal flow reduction regime in together with operation of a fish hatchery would constitute adequate minimization under CWA § 316(b).

Therefore, on the basis of Agency precedent alone, a monetized estimate of benefits for applying CWA § 316(b)'s wholly disproportionate cost test to an individual case-by-case permit development is **not** required. Still, EPA does not think it was unreasonable or inappropriate for the Region to make efforts to develop monetized benefits estimates as **part** of its evaluation, despite the fact that they unavoidably cannot capture all relevant benefits. First, there is nothing that legally precludes consideration of monetized benefits estimates as long as they are used appropriately in conjunction with other considerations. Second, EPA did use the monetized estimates reasonably in combination with other considerations, such as our nonmonetized quantitative and qualitative benefits assessments. EPA did not use the monetized assessment as the sole factor determining the result of the wholly disproportionate cost test. Third, monetized estimates, if they can be reasonably developed, are clearly **not irrelevant** to consideration of benefits.

EPA has therefore estimated benefits using nonmonetized quantitative and qualitative considerations as well as monetized measurements. EPA also developed and considered a number of different benefits estimation methodologies, including estimates prepared by other parties, such as the permittee. This is consistent with the broad discretion left to the Agency by the applicable statute and regulations in the application of the wholly disproportionate cost test under CWA § 316(b). EPA also believes it is

[5] EPA notes that the permittee appealed the Region's decision in Brunswick to the Administrator, who remanded the matter to the Region on grounds other than the economic review. Moreover, the permit appeal was later settled and did not ultimately require flow reductions leading to the installation of cooling towers. The resolution instead involved, among other things, installation of fine mesh screens and seasonal flow reductions. See James R. May, *The Quick and the Dead: Fish Entrainment, Entrapment, and the Implementation and Application of Section 316(b) of the Clean Water Act*, 20 Vt. L. Rev. 373, 411–14 (1995) (extensive discussion of history of the Brunswick permit appeal).

reasonable and appropriate given the uncertainties inherent in all of these methods and the nature of the wholly disproportionate cost test.[6]

EPA's approach is also consistent with natural resource economics theory, as was discussed in §§ 7.6.3b and 7.6.3a of EPA's July 22, 2002, Permit Determinations Document, and as has been noted by various commenters.[7] Even many economists who favor developing monetized estimates of the benefits of protecting "environmental services" in order to support cost-benefit analysis or other economic analyses in environmental regulation also recognize its limitations. These economists caution that precise monetization of environmental benefits is not always possible, that uncertainties should be acknowledged, that the numeric results of these analyses should **not** be regarded as strictly determinative of the policy decisions at hand to the exclusion of other factors, and that "care should be taken to assure that quantitative factors do not dominate important qualitative factors in decision-making."[8] Kenneth J. Arrow, et. al., "Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?" in *Economics of the Environment: Selected Readings* (Robert N. Stavins, Ed., 4th Ed. 2000), p. 321–23. As previously noted, Congress and the courts have also expressly recognized that all environmental benefits cannot be monetized or otherwise quantified.

a. Quantitative, Nonmonetized Benefits

As was discussed in detail in Chapter 7 of EPA's July 22, 2002, Permit Determinations Document, the magnitude of the adverse environmental impacts from current operations of the BPS cooling water intake structures is severe. Vast numbers of individual organisms—literally trillions of organisms, including billions of fish eggs, fish larvae, and adult and juvenile fish—are being killed or injured annually as a result of entrainment and impingement at BPS. BPS is also clearly taking substantial percentages of the Mount Hope Bay adult populations of a number of fish species (e.g., winter flounder, tautog, hogchoker). Moreover, the overall assemblage of fish species has collapsed in Mount Hope Bay. The balanced indigenous community of fish that should exist in Mount Hope Bay has been severely compromised. EPA believes that BPS's take of organisms through its cooling water intake structure has contributed to the fishery collapse and is helping to prevent or inhibit a recovery despite steps being taken by the public to promote such a recovery, including fishing restrictions and water pollution reductions.

The capacity limits proposed in the new NPDES permit for BPS require a reduction in cooling water withdrawals from Mount Hope Bay of approximately 96 percent. As was discussed in EPA's July 22, 2002, Permit Determinations Document, the Agency can generally assume that this will result in a 96 percent reduction in entrainment and impingement of marine organisms by the BPS cooling water intake. (This assumption of proportionality of flow reduction to entrainment and impingement reductions is typically used in the field and provides a reasonable estimate.) This is a very substantial reduction in adverse environmental impact. The alternative intake flow limits proposed by the permittee would achieve only approximately a 33 percent reduction in flow and entrainment and impingement. Thus, EPA's proposed permit limits achieve far greater reduction of adverse environmental impacts than the

[6] See also *Economic Guidelines*, at p. 65 (recommends that consideration be given to "using more than one method to estimate benefits" because different methods allow comparisons of different measures of value, different methods may address different subsets of total value, and "some components of the total value of benefits may not be amenable to valuation and will need to be described in other terms when presenting the analytic results").

[7] See also *Economic Guidelines*, at pp. 69, 175, 178.

[8] Not all economists favor the use of classic cost-benefit analysis to drive the development of environmental regulation. See *§ 7.6.3b, n. 56, of EPA's July 22, 2002, Permit Determinations Document*.

limits proposed by the permittee and will thus better achieve the CWA objective of "minimizing adverse environmental impact" than the permitee's proposed limits.

b. Nonmonetized Qualitative Consideration of Benefits

The limitations of our methods and data preclude us from monetizing (or otherwise quantifying) the full ecological benefits of reduced cooling water intake volumes and associated reductions in entrainment and impingement of marine organisms. These limits are discussed in Chapter 7 of EPA's July 22, 2002, Permit Determinations Document and elsewhere in this document and the benefits estimate analyses by EPA's consultants that the Agency has incorporated herein by reference. Therefore, it is appropriate to consider ecological benefits from a qualitative perspective as well.[9]

EPA presented its qualitative assessment of the benefits of the permit's CWA § 316(b)-based permit limits in § 7.6.3a of EPA's July 22, 2002, Permit Determinations Document. That analysis will not be repeated here, but EPA notes that the Agency concluded and continues to conclude that when considered outside of a strictly monetary framework, the public benefits of implementing the Closed-Cycle Entire Station option are highly significant. The other options, including the alternative limits proposed by the permittee, also offer benefits in this regard, but the degree of significance declines as the amount of entrainment/impingement allowed to continue increases and the corresponding chance that the improvements will be sufficient to facilitate a recovery of the collapsed Mount Hope Bay fishery is diminished. From this perspective, EPA believes the alternative limits proposed by the permittee offer far fewer benefits than would be realized by the permit limits proposed by EPA.

A number of commenters expressly or implicitly indicated their agreement with EPA's qualitative assessment of the benefits of the permit's limits. No comments provided any significant challenge to the appropriateness of undertaking this qualitative assessment. Furthermore, there were no significant comments questioning the assessment of the great importance from a qualitative standpoint of achieving the environmental restoration of the waters and fishery of Mount Hope Bay.

The permittee did, however, question that the permit's limits would actually achieve the environmental benefits cited by EPA. Contradictorily, the permittee also questioned EPA's determination that other less stringent options (presumably including the intake limits proposed by the permittee) would **not** achieve those goals. These comments were presented at page 27 of the "Table of Additional Detailed Comments" that was included as Attachment 4 to the permittee's comments on the Draft Permit (AR 1218). These comments question the reasonableness of EPA's biological analyses rather than the theoretical soundness of considering environmental benefits from a qualitative standpoint. EPA has addressed the biological analysis issues in detail in other responses to comments.

EPA notes here, however, that it continues to conclude that the intake limits included in the BPS permit, in conjunction with the permit's thermal discharge restrictions and other environmental improvements, such as the strong fishing restrictions that are currently in place, will provide an opportunity for the Mount Hope Bay fishery to recover. EPA further believes that it is reasonable to expect such a recovery to occur under those circumstances. The Agency also continues to conclude that significantly less stringent permit limits, such as those proposed by the permittee, are likely to prevent, delay, or otherwise significantly interfere with or impede such a fishery recovery. In this regard, EPA also concludes that the benefits that would be achieved under the permittee's proposed limits are likely to be materially lower than indicated by the simple proportional difference in reductions in flow and entrainment and

[9] See Citations in § 7.6.3a of EPA's July 22, 2002, Permit Determinations Document. See also *Economic Guidelines*, at pp. 66, 176–178.

impingement between the permittee's and EPA's proposed limits. EPA has concluded that the permittee's proposed limits are not likely to meet the threshold reductions in flow and entrainment and impingement that are needed to support fishery recovery and, thus, may achieve no material benefit with respect to this important public policy objective.

EPA recognizes that there is unavoidable uncertainty regarding exactly what is needed to allow the fishery to recover and that even the BTA-based intake flow limits proposed by EPA, which allow a 56 MGD withdrawal of water from Mount Hope Bay, will entail continued adverse environmental effects from entrainment and impingement. EPA has explained, however, that the limits it has proposed appear to be consistent with BTA and will require a substantial reduction in entrainment and impingement, as well as from thermal discharges. Moreover, EPA has explained why it concludes that these limits should allow a recovery of the Mount Hope Bay fishery, while any significantly less stringent limitations are unlikely to do so. Furthermore, regardless of the ultimate recovery of the fishery, it is indisputable that EPA's permit limits will achieve far greater reductions in entrainment and impingement than the permit limits proposed by the permittee (approximately 96 percent vs. approximately 33 percent) and, thus, will achieve substantially greater benefits in a qualitative sense. As stated in § 7.6.3a of EPA's July 22, 2002, Permit Determinations Document:

> Looked at outside of a strictly monetary framework, EPA believes that the public benefits of implementing the Closed-Cycle Entire Station option are highly significant. The benefits of the other options also have some significance but the degree of significance declines as the amount of entrainment/impingement allowed to continue increases and the corresponding chance that the improvements will be sufficient to facilitate a recovery of the collapsed Mount Hope Bay fishery is diminished.

EPA deems this view reasonable and continues to hold it.

The permittee also commented (page 27 of the "Table of Additional Detailed Comments" included as Attachment 4 to the permittee's comments on the Draft Permit (AR 1218)) that the factors that EPA pointed to in supporting its qualitative consideration of the benefits of the new cooling water intake permit limits create no specific obligations for BPS under CWA § 316(b) and that BPS's obligations related to cooling water intake structures are determined solely by CWA § 316(b). Moreover, the permittee argues that the fact that fishing restrictions and water pollution control improvements have been undertaken by others does not create any obligation on BPS to undertake any improvements on its part because its obligations are determined solely by CWA § 316(b). In response, EPA ponits out that the Agency has determined the cooling water intake structure limitations applicable to BPS based on CWA § 316(b).[10] Under EPA's interpretation of this provision, however, the Agency is to apply a wholly disproportionate cost test requiring some consideration of benefits and costs. In considering benefits from a qualitative standpoint, EPA has looked to other public actions and statements of policy as indicators of the qualitative importance of the environmental improvements at issue. EPA did not point to these matters as if they created a legal requirement for the specific intake reductions by the permittee. They simply informed the Agency's qualitative assessment of benefits under CWA § 316(b).

c. Monetized Benefits Assessments

For the Draft Permit, EPA developed and considered a number of different approaches to estimating monetized benefits of the environmental improvements that would be provided by more stringent cooling

[10] As is discussed elsewhere, these limitations are also supported by the application of water quality standards as per CWA §§ 301(b)(1)(C) and 401(a)(1) and 401(a)(2).

water intake permit limits under CWA § 316(b). EPA considered analyses prepared by EPA as well as those prepared by other interested parties. The Agency evaluated both use and nonuse values. EPA also presented an HRC analysis that did not directly estimate the benefits of cooling water intake improvements but that did provide relevant information for EPA to consider in assessing costs and benefits because it estimated what it would cost the public to replace the fish lost to the cooling water intake through environmental restoration measures (rather than CWIS improvements). Moreover, EPA explained the details of the methods being used and discussed their limitations. This analysis is presented in § 7.6 of EPA's July 22, 2002, Permit Determinations Document and will not be repeated here.

Having considered the comments received on the Draft Permit, EPA continues to believe that its monetized analyses were reasonable and appropriate in the context of developing CWA § 316(b) limits for an individual NPDES permit. Indeed, EPA does not believe that is was necessarily required to prepare any monetized assessments at all. EPA's responses to comments on its specific benefits analyses are covered in detail elsewhere in this document and in a series of memoranda prepared by the Agency's expert consultants. EPA worked with the consultants on the development of these memoranda, and independently reviewed them, and decided to incorporate them by reference into these responses to comments. As a result, the Agency will not repeat the details of the memoranda here.

In addition, after consideration of the public comments, EPA concluded that there were certain improvements it could make to its benefits assessments for the permit and consequently prepared some revised analyses. These are also presented in memoranda by the Agency's expert contractors. Again, EPA worked with the contractors on the development of these memoranda, independently reviewed them, and decided to incorporate them by reference into these responses to comments. As a result, the Agency will not repeat the details of the memoranda here. Instead, the Agency will only briefly discuss certain aspects of the memoranda here and present their overall conclusions.

i. Use Values (Commercial and Recreational)

EPA presented monetized commercial and recreational use value estimates for the Draft Permit at § 7.6.3b of the July 22, 2002, Permit Determinations Document. These were presented as part of what EPA referred to as "the benefits transfer" analysis. (Using this label was a poor choice in retrospect since the phrase "benefits transfer" refers more generically to a type of analysis that EPA also used for assessing nonuse values, as will be discussed below.) This analysis yielded relatively low commercial and recreational use values. In response to comments pointing to various changes that should be made or errors that should be corrected, EPA made certain improvements to these assessments. The commercial and recreational use values by themselves remain relatively low.

The commercial use values are largely discussed in the following memoranda:

a. Memorandum from Liz Strange, et al., Stratus Consulting, Inc., to Phil Colarusso, EPA-New England, "Responses to Comments on EPA-New England's July 22, 2002, Determination on the New Draft NPDES Permit for the BPS, Somerset, MA" (September 16, 2003) (the "September 16, 2003, Stratus Memorandum") and

b. Memorandum from Elena Besedin, Abt Associates, Inc., to Mark Stein and Phil Colarusso, U.S. Environmental Protection Agency Region 1, "Potential Effects of Revised I&E Estimates Submitted by Stratus Consulting on September 16, 2003, on the Estimated Benefits of Installation of Cooling Towers at BPS" (September 18, 2003) (the "September 18, 2003, Abt Memorandum on Revised I&E and Benefits Estimates").

Various improvements were made to the commercial use analyses based on the permittee's comments (e.g., using discounting concepts to reflect the estimated timing of benefits realization). These are discussed in detail in the referenced memoranda. The revised estimate of annual monetized commercial use benefits from the environmental improvements required by the new § 316(b) permit limits are approximately $15,359 (2002$), undiscounted. The discounted annual commercial fishery benefits losses are $11,728 and $8,105 per year, discounted respectively at 3 and 7 percent. EPA accepts the idea that it is reasonable to use discounting in this analysis and concludes that 3 percent is the more appropriate discount factor for this analysis. Therefore, the most appropriate commercial use value estimate from these figures is $11,728 per year.

The recreational use values are largely discussed in the following memoranda:

a. Memorandum from Svetlana Semenova, Elena Besedin, Michael Fisher, Abt Associates, Inc., to Mark Stein and Phil Colarusso, EPA-New England, "Response to Comments on Assessment of Recreational Fishing Benefits Presented in EPA Region 1's July 22, 2002, Draft Determination on the NPDES Permit for BPS, Somerset, MA" (October 2, 2003) (the "October 2, 2003, Response to Comments on Recreational Fishing Benefits"); and

b. September 19, 2003, Abt Memorandum on Revised I&E and Benefits Estimates (referenced above).

Various improvements were made to the recreational use analyses based on the permittee's comments (e.g., using discounting concepts to reflect the estimated timing of benefits realization). These are discussed in detail in the referenced memoranda. The one change to be mentioned in slightly more detail here is that (also in response to comments from the permittee) EPA re-estimated its recreational use benefits estimate using a so-called Random Utility Model. Specifically, EPA used a Random Utility Model developed by the National Marine Fisheries Service (NMFS) (Hicks, Steinback, Gautam, and Thunberg, 1999, Volume II: The Economic Value of New England and Mid-Atlantic Sportfishing in 1994. Hicks et al., 1999). In its comments, the permittee recommended that EPA use this model. This is discussed in detail in the above-referenced memorandum concerning recreational use benefits.[11] As mentioned above, the revised use value estimates continued to produce relatively modest values similar to the original estimates.

Based on the revised analysis, the estimated annual recreational use benefits from compliance with the new CWA § 316(b) permit limits are $93,041 (2002$), undiscounted. If timing of recreational fishing benefits is taken into account, the discounted recreational benefits are $72,648 and $53,420 per year, discounted at 3 and 7 percent, respectively. Since EPA accepts the idea that it is reasonable to use discounting in this analysis and concludes that 3 percent is the more appropriate discount factor for this analysis, the most appropriate recreational use value figure to use from this table is a gain of $72,648 per year from the improvements required by the § 316(b) permit limits.

Therefore, on the basis of the above analyses, the revised estimate of the total annual use value (combined commercial and recreational values) of the environmental improvements required by the new CWA § 316(b) permit requirements is $108,399 (2002$), undiscounted. If timing of use benefits is taken into account, the total commercial and recreational fishery benefits are $84,376 and $61,525 per year, discounted, respectively, at 3 and 7 percent. EPA believes that the former figure is the more appropriate one based on the 3 percent discount rate.

This annual use value estimate is obviously relatively modest. In interpreting this result, however, one must remember that this analysis is also very limited in scope. It leaves out or under-values a number of important aspects of the total value of the resources. First, one must remember that this analysis does not quantify a direct use value for either forage species or the unlanded portion of commercial and

[11] See also, generally, *Economic Guidelines*, at p. 73.

recreational species. This is because neither forage species nor unlanded commercial or recreational fish have direct uses or, therefore, direct use values. Second, the portion of impingement and entrainment losses consisting of fish that are landed by recreational or commercial fishermen represents a small portion of the total age 1 equivalent losses of commercial and recreational fish. Third, recreational and commercial fish (harvested or unharvested) represent less than 15 percent of the total age 1 equivalent losses. Therefore, the use value figures represent only a small portion of the total fish lost to entrainment and impingement. Fourth, as previously discussed, it is also important to understand that this use value estimate omits the increased use value that would result from recovery of the Mount Hope Bay fishery, which EPA expects to occur under its proposed permit limits but not under the limits proposed by the permittee. Finally, this analysis also leaves out certain ecological benefits and, most importantly, the **nonuse values** of the fish that would be preserved as a result of the permit limits proposed by EPA under CWA § 316(b). (Nonuse values are discussed below.) Limitations of the use value analyses are also discussed at pp. 7-142 to 7-145 of EPA's July 22, 2002, Permit Determinations Document and in the consultant memoranda referenced above. In sum, the use value analysis by itself must be regarded as a dramatically incomplete underestimate of the **total** value of resources that would be preserved as a result of the new permit limits issued under CWA § 316(b).

Finally, EPA also notes that the permittee provided additional comments relevant to EPA's use value analyses in a July 30, 2003, submission to EPA. This submission from the permittee appended additional comments from its consultants, Robert Stavins (July 29, 2003). EPA has reviewed and considered these comments. EPA feels the significant points from these comments have been responded to, here and elsewhere, in these responses to comments and in the following memoranda by its consultants:

a. the September 16, 2003, Stratus Memorandum (referenced above) and

b. the October 2, 2003, Response to Comments on Recreational Fishing Benefits (referenced above).

ii. Nonuse Values

As EPA has explained and as commenters have stated, accounting for nonuse values is a critical component of developing as complete an estimate of the total value of ecological resources as possible. In some cases, the nonuse values may represent the bulk of the monetized estimate of total value, and leaving them out entirely would result in an extreme underestimate of total value. Nonuse values include such items as "existence value" and "bequest value." Nonuse values are discussed in § 7.6.3b of EPA's July 22, 2002, Permit Determinations Document,[12] as well as elsewhere in these responses to comments and in the following contractor memoranda:

a. Memorandum from Elena Besedin, Ryan Wardwell, and Michael Fisher, Abt Associates Inc., to Mark Stein and Phil Colarusso, EPA-Region 1, "Meta-Analysis of Non-Use Benefits" (September 2, 2003) ("the September 2, 2003, Non-Use Benefits Meta-Analysis Memorandum");

b. Memorandum from Elena Besedin, Ryan Wardwell, and Michael Fisher, Abt Associates Inc., to Mark Stein and Phil Colarusso, EPA-Region 1, "Response to Comments on Non-Use Benefits Presented in EPA Region 1's July 22, 2002, Draft Determination on the NPDES Permit for BPS, Somerset, MA" (September 2, 2003) ("the September 2, 2003, Non-Use Benefits Responses to Comments Memorandum"); and

c. the September 16, 2003, Stratus Memorandum (referenced above).

[12] See also, generally, *Economic Guidelines*, at pp. 67, 70-71.

EPA has worked with Abt Associates, Inc., and Stratus Consulting, Inc., on the development of these memoranda, independently reviewed them, and is adopting and incorporating them by reference in these responses to comments.

For the Draft Permit, EPA considered and applied multiple methods for estimating the nonuse values of the environmental improvements required by the CWA § 316(b) permit limits.[13] These estimates are presented in § 7.6.3b of EPA's July 22, 2002, Permit Determinations Document and are discussed elsewhere in these responses to comments and in certain of our contractor memoranda. As part of the analysis that EPA labeled "the Benefits Transfer" analysis, the Agency used a "rule of thumb" approach from the literature and past EPA practice under which non-use values were estimated to be 50 percent of the recreational use values. This approach was developed as an option preferable to leaving non-use values out altogether. Yet, as discussed in EPA's July 22, 2002, Permit Determinations Document, this approach is rather arbitrary, likely to yield a substantial underestimate, and should be replaced with better estimation methods if at all possible. See also September 16, 2003, Stratus Memorandum. The permittee also criticized the arbitrariness of the 50 percent of recreational value rule of thumb, essentially agreeing that its values should be disregarded. EPA has, in fact, decided on the basis of these points to disregard the results of the 50 percent of recreational value rule of thumb as unreasonable.

EPA also conducted a type of "benefits transfer" nonuse value assessment that it referred to as the "Per-Person Recreational and Nonuse Value Analysis" (the "Per-Person Analysis"). Here the Agency uses the term "benefits transfer" to refer to a general type of analysis relying on the application of results from studies of other cases to the case at hand, rather than to refer to a specific analysis as the phrase was used above.[14] This analysis is presented in § 7.6.3b.ii of EPA's July 22, 2002, Permit Determinations Document, including discussion of its limitations and why its results were likely conservative. Some commenters expressed support for this analysis, though they also pointed to reasons why it likely produced an underestimate of nonuse values.

The permittee, however, stated a number of disagreements with this analysis and essentially argued that it should also be disregarded. At times, the permittee seemed to argue that the **only** acceptable method of estimating non-use benefits would be to conduct original research (such as a contingent valuation study) on the specific case at hand. EPA disagrees with this position. Many resource economists support the idea that benefits transfer analyses, properly conducted, can be used as an alternative to a primary research survey in order to estimate non-use benefits.[15] While it might be preferable to conduct such research in an ideal world, EPA previously explained that it was not deemed feasible as a matter of cost or timing to conduct such a primary study here.[16] Nor, in any event, does the Agency think that such studies are required for developing individual CWA § 316(b) permits (or for developing regulations). EPA is not aware of any other case in which EPA has conducted such a site-specific contingent valuation study for developing site-specific CWA § 316(b) permit limits. EPA also notes that failing to assess non-use values would only tend to make the qualitative assessment of ecological benefits all the more important.

[13] EPA notes that the permittee did not develop an estimate of non-use benefits for either its December 2001 CWA § 316(b) Demonstration Document or its comments on the Draft Permit, thus valuing non-use benefits at zero. As discussed herein, EPA believes this approach is unreasonable.

[14] See, generally, *Economic Guidelines*, at pp. 59, 85-87.

[15] *Id.*

[16] See, generally, *Economic Guidelines*, at pp. 59, 86.

The permittee also presented comments challenging the reasonableness and appropriateness of the Per-Person Analysis specifically. These comments are responded to in the September 2, 2003, Non-Use Benefits Responses to Comments Memorandum and the September 2, 2003, Non-Use Benefits Meta-Analysis Memorandum, as well as elsewhere in this responses to comments document. Ironically, EPA based the Per-Person Analysis on an approach that was used in a study of the Tuolumne River for which one of the permittee's consultants, Robert Stavins, was the principal author. The permittee and Robert Stavins now question the validity of this method and challenge whether it is appropriate to use it for Mount Hope Bay because, among other points raised, the resources of the bay are not of national importance. EPA has considered these comments and it believes the approach was reasonable for use in this context where (a) a precise benefits estimate is not needed, (b) the Agency did not have better data at that time, (c) nonuse values could potentially be very significant, and (d) the Agency included many conservative assumptions in the analysis. EPA also disagrees that it was unreasonable to apply this approach to Mount Hope Bay. As discussed in its qualitative assessment of benefits, the Agency believes the fishery resources of Mount Hope Bay are very important to the public beyond the merely local level. Mount Hope Bay is a multi-State water body and is an important nursery area for fish of the Narragansett Bay estuary, while the Narragansett Bay estuary is a federally designated estuary of national significance under the Clean Water Act. Moreover, the Agency believes that the public comments it received supporting the Draft Permit from commenters from across Massachusetts, Rhode Island, New England, and the Nation as a whole tend to support its view in this regard.

The nonuse value estimates produced from the Per-Person Analysis were substantial, and the Agency continues to believe these estimates were reasonable. That being said, EPA also has made a number of improvements to its analysis in response to comments from the permittee. Specifically, building from the Per-Person Analysis, EPA has conducted a more sophisticated benefits transfer analysis that is presented in the September 2, 2003, Non-Use Benefits Meta-Analysis Memorandum. In addition, the permittee's comments are responded to in the September 2, 2003, Non-Use Benefits Responses to Comments Memorandum as well as elsewhere in this responses to comments document. EPA will not repeat the discussion in its contractors' memoranda here but will highlight just a few points. First, EPA conducted an even more detailed literature survey to support the Meta-Analysis study. EPA believes that the studies used from the literature survey were reasonable and appropriate and disagrees with the permittee's comment that the studies were not suitable for this benefits transfer. Second, EPA used a statistical regression-based approach, rather than mean values, to provide a more precise benefits transfer applicable to the specific ecological services at issue in its case. While it was reasonable for its original analysis to rely on mean values, the revised approach is more rigorous.[17] Third, EPA revised its definition of the affected population to an approach patterned after approaches from the more recent literature. This approach provided a range of values based on the population of households containing North Atlantic Region anglers and the population of households residing within a particular distance from Mount Hope Bay. Again, EPA does not think our original approach based on membership in certain environmental and fishing organizations was unreasonable. Economic studies find that members of environmental organizations are willing to contribute more to environmental causes, including aquatic habitat improvements. See, e.g., Johnston et al., 2002, "Combining Economic and Ecological Indicators to Prioritize Salt Marsh Restoration Actions," American Journal of Agricultural Economics 84(5):1362-1370. However, the approach in the Meta-Analysis more closely follows the more recent literature. As discussed in the Agency's consultant's memoranda and elsewhere in the permit record, the current Meta-Analysis approach has certain limitations, but it continues to be conservative and for several reasons may provide an underestimate of benefits.

[17] See, generally, *Economic Guidelines*, at p. 87.

The results from the Meta-Analysis also reveal very substantial nonuse benefits from the environmental improvements required by the CWA § 316(b) permit limits in the new permit for BPS. Moreover, EPA emphasizes that these benefits are **not** based on any particular conclusion regarding whether or not these permit limits are necessary to allow `the overall recovery of the fishery of Mount Hope Bay. These values are simply based on estimates of the numbers of fish that would no longer be lost to entrainment and impingement by the BPS cooling water intake. These benefits are substantially greater than those that would be provided by the permit limits proposed by the permittee. Moreover, EPA does believe that the permit limits it has proposed will be sufficient to allow an overall fishery recovery, whereas the limits proposed by the permittee will be insufficient. Therefore, the gap between the benefits of EPA's permit limits and the permit limits proposed by the permittee is likely to be all the more significant.

EPA estimates the annual nonuse value of the entrainment and impingement reductions that will result from the proposed CWA § 316(b) permit limits to be $23.4 and $20.1 million per year (2002$) discounted by 3 and 7 percent, respectively (and rounded off). See Table 5 of the September 2, 2003, Non-Use Benefits Meta-Analysis Memorandum. Since EPA believes 3 percent is the more appropriate discount rate here, the $23.4 million per year (2002$) is the more appropriate figure to use.

EPA also notes that the permittee provided additional comments relevant to EPA's benefits transfer analysis approaches, including the Meta-Analysis approach, in a July 30, 2003, submission to EPA. This submission from the permittee appended additional pertinent comments from its consultants, Robert Stavins (July 29, 2003). EPA has also reviewed and considered these comments. EPA believes the significant points from these comments have been responded to, here and elsewhere, in these responses to comments and in the following memoranda by its consultants:

a. the September 2, 2003, Non-Use Benefits Meta-Analysis Memorandum (referenced above); and

b. the September 2, 2003, Non-Use Benefits Responses to Comments Memorandum (referenced above).

iii. Total Value

The total value is simply the sum of the use values and the nonuse values. EPA estimates the total annual value of the entrainment and impingement reductions that will result from the proposed CWA § 316(b) permit limits to be $23.4 million per year (2002$) discounted at 3 percent (and rounded off).

iv. Habitat Restoration Costs and Values

As mentioned above, in addition to estimating the use and non-use value of the environmental improvements required by the new CWA § 316(b) permit limits, EPA also prepared a Habitat Restoration Cost (HRC) analysis in support of the Draft Permit. The HRC analysis did not directly estimate the benefits of the proposed cooling water intake improvements but did provide useful information for EPA to consider in assessing overall costs and benefits. Specifically, the HRC analysis conservatively estimated what it would cost the public to replace fish lost to the cooling water intake through environmental restoration measures (rather than cooling water intake structure improvements).[18] EPA felt this was a useful point of comparison for consideration of CWA § 316(b) permit compliance costs. EPA also pointed out that there was some limited information from other cases suggesting that HRC values might tend to be less than total value estimates so that the HRC values might, in effect, put a lower bound

[18] Please note that this did not include an evaluation of the feasibility and effectiveness of specific restoration projects at specific sites or involve a determination that such projects would actually be effective for fishery restoration within Mount Hope Bay if the entrainment and impingement by BPS was not substantially reduced. The consideration of restoration was more general in nature.

on possible benefits estimates. The HRC analysis is discussed in §§ 7.6.3b.iii and iv, 7.7.4a, and 7.7.6 of EPA's July 22, 2002, Permit Determinations Document.

A number of commenters were supportive of the HRC analysis and felt that EPA properly undertook and considered it. The permittee, however, objected strenuously to it. Yet, to the extent that the permittee complains that the Region confused "costs" and "benefits" in the HRC analysis, the comment is incorrect. The Region plainly and correctly distinguished the two.

It is also interesting to note that while the permittee seems to have argued in some of its comments that the HRC analysis is entirely inappropriate as a theoretical matter to use for estimating monetized benefits of ecological improvements, it also stated in its comments that "a necessary condition for using defensive expenditures or averting behavior for purposes of benefit estimation is that the researcher **observes** people revealing their preferences by **actually (and voluntarily) incurring costs** to avert (or tolerate) the environmental disruption in question."[19] Thus, the permittee appears to accept the possible validity of this type of replacement cost approach to inferring the monetary value of ecological improvements under certain conditions. In the above-referenced September 16, 2003, Stratus Memorandum, EPA's contractor, Stratus Consulting Inc., argues that the facts they relied upon in preparing the HRC analysis reveal voluntary willingness to pay in the area of BPS for the type of restoration projects being evaluated. Thus, Stratus urges that our case would represent an appropriate one for using replacement costs to infer the value of the natural resources in question. EPA does not need to resolve this issue here. The Agency has decided to continue **not** using the HRC-related analyses to infer estimated values for preserving the fish that would otherwise be lost to the BPS cooling water intake structure. EPA continues to believe, however, that these analyses provide important information to consider in making the CWA § 316(b) permitting determination.

The permittee also commented with respect to the HRC analysis that there is no reason to expect that restoration costs will necessarily be lower than total value because there is no logical relationship between the cost of restoring certain natural resources and the value of those resources that would dictate such a result. EPA believes this point is probably fair. The Agency notes, however, that it did not significantly rely on this factor in reaching its conclusion for the Draft Permit—EPA only pointed out that there was some admittedly limited data that seemed to suggest that HRC costs would tend to be lower than total value. Obviously, EPA does not rely on this factor for its decision on the Final Permit.

Since the permittee also complained that the HRC analysis estimated the cost of restoration projects but did not reveal the willingness of people to pay for such restoration efforts, EPA also prepared a revised analysis based on the HRC approach. The revised analysis sought to measure people's willingness to pay for these types of restoration projects. In other words, whereas the initial HRC analysis estimated what it would cost to undertake environmental restoration projects necessary to produce equivalent numbers and types of fish to offset those lost to the BPS cooling water intake structure, the revised analysis estimated people's willingness to pay values for undertaking such restoration projects. EPA's revised analysis involved a benefits transfer analysis using a study of willingness to pay for the fish production services of these types of environmental restoration projects (e.g., submerged aquatic vegetation, coastal wetlands) in the Peconic Bay area of Long Island. EPA's analysis is presented in the Memorandum from Elena Besedin, Ryan Wardwell, and Michael Fisher, Abt Associates, Inc., to Mark Stein and Phil Colarusso, EPA-Region 1, "Response to Comments on the Habitat Replacement Analysis of I&E Losses at Brayton Point" (September 2, 2003) (the "September 2, 2003, Revised Habitat Replacement Analysis"). EPA has worked with Abt Associates on the development of this report, independently reviewed it, and is adopting and incorporating it by reference into these responses to comments.

[19] See, generally, *Economic Guidelines*, at p. 99.

The September 2, 2003, Revised Habitat Replacement Analysis found that people evidence substantial willingness to pay for environmental restoration projects to restore fish populations. EPA's evaluation was based on consideration of (a) the type and number of restoration projects needed to produce fish equivalent to those that would be preserved by the reduced entrainment and impingement that would result from compliance with the proposed permit limits, (b) the per-household willingness to pay for these types of restoration projects, and (c) the affected population in the area of BPS. Based on the approximately 96 percent reduction in entrainment and impingement that compliance with the new permit's reduced flow limits would achieve, EPA estimated a range of public willingness to pay for the necessary restoration projects of $11,669,407 per year for counties abutting Mount Hope Bay (with a nonuse only value of $10,835,352 per year) to $18,835,025 per year (with a nonuse only value of $17,488,818 per year) for all households within 32.43 miles from Mount Hope Bay. (All figures are given in 2002 dollars.) These willingness-to-pay values do not represent all of the organisms lost to I&E, nor do they represent all the species that could benefit from wetland and eelgrass restoration. Moreover, these values also do not represent all the households that may or even are likely to hold value for preserving the natural resources in question. These estimates, therefore, are likely to represent a lower-bound for the value that people would place on the amount of habitat restoration that would be needed to produce an equivalent number of fish to those that would be saved from entrainment and impingement by compliance with the new intake flow limits in the BPS NPDES permit.

Once again, EPA Region 1 does not propose to use the values for fish and shellfish production services of the environmental restoration projects as a proxy for the value of the fish/shellfish themselves (though the potential validity of this approach could be worth future consideration). Instead, the Agency provides this data as useful information for policy/decision-making officials to consider in otherwise reaching a final conclusion over whether or not the costs of applying Best Technology Available-based requirements should be considered wholly disproportionate to the benefits of doing so.

EPA also notes that the permittee provided additional comments on the HRC analysis, as well as the development of the revisions to it based on the Peconic Bay study, in a July 30, 2003, submission to EPA. This submission from the permittee also appended additional comments from its consultants, Robert Stavins (July 29, 2003) and Economic Analysis, Inc. (June 2, 2003; attached as Appendix A to the Stavins memorandum). EPA has also reviewed and considered these comments. EPA feels the significant points from these comments have been responded to, here and elsewhere, in these responses to comments and in the following memoranda by our consultants:

a. the September 2, 2003, Revised Habitat Replacement Analysis (referenced above);

b. the September 16, 2003, Stratus Memorandum (referenced above); and

c. the Memorandum from Elena Besedin, Marisa Mazotta, and Robert Johnston, Abt Associates, Inc., to Mark Stein, Phil Colarusso, EPA-New England, "Response to Comments on Notice of Data Availability, Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities Submitted by PG&E to EPA Region 1" (October 2, 2003).

2. Cost Estimation

EPA's cooling water intake capacity limitations for the new NPDES permit for BPS are based on the Best Technology Available for minimizing adverse environmental impacts associated with the plant. EPA has determined that the BTA for BPS is a retrofit of mechanical draft wet cooling towers to the facility so as to convert the cooling system from an open-cycle system to a closed-cycle system (other than the need for make-up water). This is discussed in detail in Chapter 7 of EPA's July 22, 2002, Permit Determinations Document. Virtually all commenters agreed that this technology would be the best technological approach to meeting the capacity intake limits that EPA has proposed.[20] Indeed, the permitee's proposed permit limits were, in fact, based on the use of this very same technology in its so-called "Enhanced Multi-Mode" configuration. Of course, the permittee disagreed that capacity limits based on providing cooling towers for all four of the BPS generating units are necessary under CWA § 316(b), either from a biological or a legal standpoint. Thus, the permittee's proposed permit limits were based on providing cooling towers in their Enhanced Multi-Mode proposal that would handle the flow from Unit 3 (or Unit 4 if that unit is operating). The permittee also argues that EPA's analysis supporting its CWA § 316(b) limits is based on an incorrect assessment of the costs of implementing the BTA approach for all four generating units, and is inappropriate as a matter of cost-benefit comparison.

In Chapter 7 of EPA's July 22, 2002, Permit Determinations Document, EPA presented detailed cost estimates for BPS to implement the technologies needed to comply with the intake capacity limits proposed for the new permit under CWA § 316(b). As discussed above, at this stage, it is impossible to generate truly precise cost estimates because there are so many unknown factors that must be predicted. A precise estimate of costs is not, however, required. Rather, a reasonable assessment of cost is needed and EPA's consideration of costs was more than reasonable.

EPA's assessment considered capital costs, construction costs, long-term operations and maintenance costs, long-term costs of generation efficiency losses and energy needs, tax consequences, and many other factors. The Agency also considered the costs using multiple analytical approaches (e.g., the "§ 316(b) rulemaking method" as applied to BPS and the "line-by-line method" for estimating capital costs) and multiple possible inputs for different variables (e.g., the useful life of the equipment). EPA evaluated the costs for multiple technological options, including the permittee's Enhanced Multi-Mode proposal, and carefully evaluated the permittee's cost estimates. Finally, EPA's assessment of costs incorporated many conservative assumptions and explained the limitations of EPA's analysis.

EPA has have received many comments with respect to its cost analysis. Some have supported it, while others have challenged it. The most detailed concerns were presented by the permittee. The comments from the permittee and others have been addressed in detail elsewhere in this document and in a number of memoranda by the Agency's consultants, including Abt Associates, Inc. and Science Applications International Corporation, Inc. (SAIC). EPA has worked with its consultants on the development of their reports, independently reviewed them, and is adopting and incorporating them by reference into these responses to comments. These reports include the following:

1. Report by Abt Associates, Inc., Prepared for U.S. Environmental Protection Agency, Region 1 Office, "Cost Analysis of Closed-Cycle Cooling Tower System for Management of Thermal Discharge and Cooling Water Intake for BPS" (August 20, 2003) (the "August 20, 2003, Cost Analysis Report");

2. Memorandum from Michael Fisher, Riley Newbert, Abt Associates, Inc., to Mark Stein, Damien Houlihan, U.S. Environmental Protection Agency Region 1, Shari Goodwin, Tetra Tech, Inc.,

[20] The U.S. Fish and Wildlife Service proposed a different technology by calling upon EPA to reconsider whether it ought to require even more stringent limitations (i.e., no flow) based on retrofitting dry cooling technology to BPS. As discussed in EPA's July 22, 2002, Permit Determinations Document and elsewhere in this document, EPA believes it is unclear whether retrofitting dry-cooling would be feasible at BPS given that EPA has been unable to find a single case of a large existing power plant converting from once-through to dry cooling. Space constraints might also preclude the use of dry cooling technology at BPS. These comments are further addressed elsewhere. In addition, the permittee and the Town of Somerset have raised concerns about other environmental issues potentially raised by the use of cooling towers (such as cooling tower vapor plumes, noise, aesthetic impacts). These comments are also addressed elsewhere in this document.

"Update of Social Cost Analysis for Closed-Cycle System Installation at BPS" (August 20, 2003) (the "August 20, 2003, Social Cost Analysis Report");

3. Report by Abt Associates, Inc., Prepared for: U.S. Environmental Protection Agency, Region 1 Office, and Tetra Tech, Inc., "Estimated Electricity Rate Impacts of Thermal Discharge/Cooling Water Intake Permit for BPS—Update of Prior Analysis and Response to Comments" (August 20, 2003) (the "August 20, 2003, Electricity Rate Impact Report");

4. The August 12, 2003, Financial Impact Report (referenced above);[21]

5. Report by SAIC, Prepared for: U.S. Environmental Protection Agency, Region 1 Office, and Tetra Tech, Inc., "Brayton Point Comment Summary & Response" (September 15, 2003);

6. Report by SAIC, Prepared for: U.S. Environmental Protection Agency, Region 1 Office, and Tetra Tech, Inc., "Revisions to and Results from the Clean Water Act Section 316(b) Cost Methodology for the BPS" (September 15, 2003);

7. Report by SAIC, Prepared for: U.S. Environmental Protection Agency, Region 1 Office, and Tetra Tech, Inc., "Statistical Analysis of USGen Costs versus SAIC Costs" (September 15, 2003);

8. Report by SAIC, Prepared for: U.S. Environmental Protection Agency, Region 1 Office, and Tetra Tech, Inc., "Construction Cost Monetary Outlay Schedule" (September 15, 2003);

9. Report by SAIC, Prepared for: U.S. Environmental Protection Agency, Region 1 Office, and Tetra Tech, Inc., "Summary of Brayton Point Cost" (September 15, 2003);

10. Report by SAIC, Prepared for: U.S. Environmental Protection Agency, Region 1 Office, and Tetra Tech, Inc., "Estimation of Number of Cooling Towers for Closed-Cycle Entire Station" (September 15, 2003);

11. Report by SAIC, Prepared for: U.S. Environmental Protection Agency, Region 1 Office, and Tetra Tech, Inc., "Brayton Point Generating Station Trip" (September 15, 2003);

12. Report by MFG, Inc., Prepared for: U.S. Environmental Protection Agency, Region 1 Office, and Tetra Tech, Inc., "An Evaluation of Cooling Tower Plume Studies Done for the Brayton Point Generating Station" (July, 2003); and

13. Report by Hatch, Inc., Prepared for: U.S. Environmental Protection Agency, Region 1 Office, and Tetra Tech, Inc., "Brayton Point Power Station Cooling Towers—Noise Impact Assessment" (September 10, 2003).

As mentioned above, to develop our capital cost estimates for the Draft Permit, EPA applied two independent approaches: the § 316(b) rulemaking method and the line-by-line method. The former used the approach that EPA developed for the national rulemaking but made certain adjustments to reflect implementation at BPS specifically, such as increasing the costs to reflect retrofitting and the use of salt water for cooling. The line-by-line method was a more site-specific approach based on a close, critical examination of the cost estimates reflected in the costing spreadsheets submitted by the permittee with its December 2001 demonstration documents. While accepting many elements of the permittee's assessment, EPA disagreed with certain other elements, which resulted in EPA's lower cost estimate. The results of

[21] As discussed above, this memorandum is not presently included in the publicly available administrative record due to Confidential Business Information issues.

these two independent estimates were relatively close to each other, but EPA conservatively chose to carry forward the estimates from the § 316(b) method for further analysis because they were higher.

In response to comments, EPA has made certain adjustments to both analyses of the capital costs. These adjustments are discussed in our consultant's memoranda and elsewhere in these responses to comments. Generally, our adjustments have resulted in somewhat higher estimates under both cases. Once again, the estimates were relatively close to each other, but this time the results for the line-by-line method were somewhat higher. EPA again conservatively chose to carry the higher figures, this time from the line-by-line analysis, forward into the subsequent stages of our cost assessment.

EPA has carefully considered the permittee's capital cost estimates as well as its comments on the Agency's capital cost estimates. The Agency recognizes the disparity between its projections and those by the permittee, but based on consideration of the information in the record, it believes EPA's estimates are reasonable and the permittee has substantially overestimated the capital costs associated with complying with the permit's CWA § 316(b) limitations. The difference in capital cost estimates is the largest single source of the difference between the total cost estimates by EPA and the permittee. See August 20, 2003, Cost Analysis Report.

EPA then incorporated our capital cost estimates, along with many other factors, into a financial analysis to determine the present value of the total, after-tax costs of installing technology needed to comply with the new § 316(b) permit limits over the life of the equipment. EPA also calculated equivalent annualized cost values. Other factors accounted for in the analysis include tax consequences, discount rates, lost energy efficiency costs, auxiliary energy costs, gains from "avoided load loss" (i.e., the ability that using cooling towers would confer on BPS to generate more electricity during hot weather periods without "bumping up" against the permit's maximum temperature limits), and other factors. It should also be noted that EPA estimated costs for a number of different options, largely depending on what approach is adopted to address any possible issues related to hazards from cooling tower vapor plumes causing fog and/or ice on roadways. In addition, EPA considered costs under different assumptions regarding the useful life of the equipment. EPA believes that 30 years is a reasonable estimate of the useful life of fiberglass cooling towers, but the permittee has maintained that 20 years is a more appropriate figure. EPA investigated costs using both assumptions.

The permittee also submitted many other comments concerning this analytical step in the cost assessment. EPA has responded to these comments in detail elsewhere in this document or in its consultants' memoranda. See August 20, 2003, Cost Analysis Report. EPA made certain changes that have generally resulted in increased cost estimates. For example, EPA increased the discount rate it used in recognition of changes in the financial status of the owners of BPS and other factors. See August 20, 2003, Abt Cost Analysis Report, Attachment 1 ("Updated Estimated Cost of Capital (Discount Rate) for Present Value/Discounted Cash Flow Analyses of Brayton Point Technology Options"). The permittee also made some adjustments to its overall cost analysis which brought its estimates down somewhat. Thus, while the gap between the overall estimates has narrowed somewhat, EPA's estimates are still two to three times lower than those of the permittee.

Because EPA investigated a number of technological options under different assumptions, the Agency has produced a range of total cost estimates. EPA believes these estimates are reasonable and, in fact, are conservative. Thus, EPA believes the permittee may actually be able to comply with the permit at lower cost. In addition, while the options the Agency has evaluated involve one technological approach or another to managing any vapor plume problem (i.e., hybrid cooling towers **or** bypass capability **or** unit outages), it recognizes that, after considering how to optimize the cooling system at the plant, the permittee might choose to combine different approaches. For example, the permittee might decide to provide hybrid cooling towers for only some of the generating units.

EPA's and the permittee's overall cost estimates are summarized in the table below that the Agency has copied from Table 11 of the August 20, 2003, Cost Analysis Report.

Summary of Company and Abt Associates/EPA Analyses: Cases Analyzed and Summary Results for Previous and Current Analyses

	Company Analyses				**Abt Associates/EPA Analyses**			
All values (in hundred thousands)	**November 2001 Analysis**		**October 2002 Analysis**		**April 2002 Proposed Permit**		**Final Permit Analysis**	
	Discount Rate		**Discount Rate**		**Equipment Life**		**Equipment Life**	
Present values are at mid-year 2002	**15%**	**20%**	**15%**	**20%**	**20-year**	**30-year**	**20-year**	**30-year**
With Modification for Plume Hazard Abatement								
Multi-Mode/Bypass Capability								
Present value	Not analyzed by company				$68.4	$68.0	$107.2	$109.6
Equivalent annual cost					$9.0	$8.3	$15.7	$15.1
Hybrid Cooling Tower								
Present value	Not analyzed by company		$278.3	$276.8	Not analyzed at proposal		$119.7	$120.2
Equivalent annual cost			$44.5	$56.8			$17.6	$16.6
With No Plume Abatement Modification								
Full Plume Abatement Impact								
Present value	$254.5	$250.3	$229.8	$220.4	$83.3	$85.8	$109.2	$111.2
Equivalent annual cost	$40.7	$51.4	$36.7	$45.3	$11.0	$10.5	$16.0	$15.4
No Plume Abatement Impact								
Present value	Not analyzed by company				Not analyzed at proposal		$88.3	$88.3
Equivalent annual cost							$13.0	$12.2

(** Note: the Abt/EPA estimates used a discount rate of 11.8 percent for the Draft Permit analysis, but increased that to a rate of 13.5 percent for the Final Permit analysis.)

(**See also page 29 of August 20, 2003, Cost Analysis Report for an explanation of the slight difference in the equivalent annual cost listed here and what the company produced.)

The figures in the above table show that EPA's cost estimates for the Final Permit (presented as total present value/equivalent annual cost) range from:

- a low value of $88.3 million/$12.2 million for a 30-year useful life (and $88.3 million/$13.0 million for a 20-year useful life), assuming no modifications for plume abatement and no actual plume abatement outages needed;
- to $111.2 million/$15.4 million for a 30-year useful life (and $109.2 million/$16.0 million for a 20-year useful life), assuming no modifications for plume abatement and 100 percent of the plume abatement outage hours reflected in the permittee's cost analysis;

- to $109.6 million/$15.1 million for a 30-year useful life (and $107.2 million/$15.7 million for a 20-year useful life), assuming plant modifications to handle vapor plume abatement concerns by allowing for bypass of cooling towers without generating unit outages;[22]
- to high values of $120.2 million/$16.6 million for a 30-year useful life (and $119.7 million/$17.6 million for a 20-year useful life), assuming plant modifications to handle vapor plume abatement concerns by utilizing hybrid cooling tower technology (obviating the need for any generating unit outages).[23]

The permittee's higher estimates assume higher possible discount rates of either 15 percent or 20 percent, as well as a 20-year useful life for the equipment. Thus, the permittee also produced a range of values. The permittee's estimate for the option, assuming no modifications for plume abatement, a 15 percent discount rate, and 100 percent of the plume abatement outage hours reflected in the permittee's analysis, is $229.8 million/$36.7 million for a 20-year useful life. Using a 20 percent discount rate, the permittee's estimates were $220.4 million/$45.3 million. These values correspond to the 20-year useful life value in the second bullet above, except that EPA uses a different discount rate. The permittee's estimate for the option, assuming the use of hybrid cooling towers and a 15 percent discount rate, is $278.3 million/$44.5 million for a 20-year useful life. Using a 20 percent discount rate, the permittee's estimates were $276.8 million/$56.8 million. These values correspond to the 20-year useful life value in the fourth bullet above, except that EPA uses a different discount rate.

3. Social Cost Estimate

In the discussion above, EPA has only considered the cost **to the permittee** of implementing technological improvements at BPS to meet the permit's new BTA-based cooling water intake limits under CWA § 316(b) (i.e., a "private cost analysis"). In applying the wholly disproportionate cost test under § 316(b), however, it is also appropriate to consider costs **from the perspective of society** (i.e., the

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[22] EPA recognizes that the restrictions placed on flow and on any once-through/bypass operations mean that the permittee will not be able to bypass whenever it wants. Bypass operations would be limited effectively to 122 hours, none of which may occur during the winter flounder spawning season (February through and including May). Therefore, if vapor plume-related outages became necessary during those months or beyond those hours, then there would be some additional outage-related cost for this option. EPA has not estimated any additional costs here, however, for the following reasons: (a) as discussed elsewhere in this document, the number of hours of outage that might be needed is highly unpredictable and the hours, if any, would vary from year to year; (b) as is also discussed elsewhere, EPA believes the permittee has likely overstated the number of hours of outage that might be needed, (c) with the bypass option no additional hours of outage would be needed for generating unit restart; and (d) the cost estimate for this option is in the middle of the range of estimates, and it is unlikely that the costs of any outage hours in excess of what is allowed by the permit would push the costs above that for the hybrid tower option; however, if the cost of this option became more expensive than the hybrid tower option, then the permittee would simply implement hybrid towers.

[23] As discussed elsewhere in these responses to comments, EPA also considered the possible need for additional noise mitigation and the potential cost for such measures. EPA did not end up adding any additional cost for noise mitigation to its capital cost estimates for several reasons, including that the Agency could not determine what would be a reasonable amount to add given the present uncertainty over what, if any, additional mitigation might be needed. EPA did, however, determine that, depending on which manufacturer's noise mitigation measure costs are considered and which EPA capital cost estimate is being considered, it appears that any capital cost increases would likely range from 3 percent to 15 percent. This is well within the approximate 25 percent range of error in the present capital cost estimates. EPA's consultant, Abt Associates, Inc., also determined that adding the highest noise mitigation cost estimate to EPA's highest total cost estimate would increase the total present value (and annualized costs) only by approximately 8 percent. (AR 3215)

"social costs"). Therefore, as in the Draft Permit analysis, see § 7.7.4c of EPA's July 22, 2002, Permit Determinations Document, for the Final Permit analysis EPA converted the company costs to social costs. The social cost analysis is presented in the August 20, 2003, Social Cost Analysis Report by our consultant, Abt Associates, Inc.

The social cost analysis differs in several important ways from the private cost analysis. The latter is framed from the perspective of the permittee and considers the cost of technology implementation in terms of the estimated change in after-tax cash flow to the permittee. Cash flows are presented in nominal dollars (i.e., without removing the expected effects of inflation) and are discounted to present value on the basis of an estimated weighted-average, after-tax cost-of-capital for the permittee. For the social cost analysis, the costs of technology implementation are viewed from the perspective of society. The social cost is understood conceptually to be the opportunity cost to society of using society's resources for installation and operation of the closed cycle system.

In its comments, the permittee accepted the social cost analytic framework used in the Abt Associates analysis for the Draft Permit, but contested the results of the analysis because it relied on estimates of technology installation, operating costs, and other operating impacts that the permittee felt constituted significant underestimates. EPA has responded to the comments regarding capital and operating costs elsewhere in this document.

To develop a social cost estimate for the Final Permit, EPA took the highest estimate from the private cost analysis and then converted it to a social cost figure. The details of this analysis are presented in the August 20, 2003, Social Cost Analysis Report (some limitations on the development of social costs are presented in footnote 2 of the report). As Abt Associates explains:

> [a]lthough the social cost and private cost values are not strictly comparable numerically—the social cost estimates are in constant 2002 dollars while the private cost estimates in *Cost Analysis* are in current dollars—it may nevertheless be noted that the social costs are, in fact of concept, consistently higher than the private costs. The principal reason for this systematic direction of difference is the use of costs without consideration of tax effects, which, in the private cost analysis, shift a significant share of the financial burden to society. Other factors that contribute to social cost being higher than private cost include the estimated higher production cost of generating units that replace electricity not available from Brayton Point because of construction outages or the permanent loss in generating capacity resulting from the auxiliary energy requirements and efficiency effects of the closed cycle system.

Id. at p. 5. While EPA did not calculate the social cost estimates that would be associated with the permittee's private cost estimates, the Agency notes that social costs would again be higher than the private costs for the reasons stated above.

The permittee does not appear to have provided a social cost analysis of its own, although, as stated above, it generally agreed with EPA's approach to social cost analysis. The permittee also stated that social costs are approximately 75 percent higher than the private costs. EPA does not agree that social costs will always be 75 percent greater than private costs. While the analytical framework for calculating social costs from private costs should remain relatively constant, the actual ratio of social costs to private costs in any given case would depend on the facts of that case. EPA acknowledges that for cases such as the present one, social costs will typically be higher than private costs. In addition, the comments filed for the permittee by its attorneys identify a social cost estimate "on the order of $390 million in present value terms." *Comments of BPS*, submitted on behalf of BPS by Foley Hoag (October 4, 2002), p. 92. However, these comments provide no explanation or reference to support this figure, and the Agency can find no analysis supporting it in any of the comments by the permittee's consultants.

The estimated social costs (present value/equivalent annual cost) for the *With Plume Abatement Technology* cases range from $168.3 million/$15.9 million for the *Multi-Mode Bypass*, 20-year equipment life case, to $196.1 million/$15.8 million for the *Hybrid Cooling Tower*, 30-year equipment life case. For the *With No Plume Abatement Technology* cases, the present value estimates range from $145.3 million/$13.7 million for the *No Plume Abatement Impact*, 20-year equipment life case, to $208.4 million/$16.8 million for the *Full Plume Abatement Impact*, 30-year equipment life case. It should be noted that the equivalent annual cost estimates for the 30-year equipment life values for each technology option—which EPA thinks are more reasonable equipment life values—are consistently lower than the 20-year equipment life values because of the greater period over which the substantial fixed costs of technology installation are amortized.

These social cost estimates for the Final Permit are higher than the estimates developed for the Draft Permit. See *Id.* at Table 2. As Abt Associates explains:

> [f]or the comparable analysis cases, the current values are approximately 24 percent higher for the *With Plume Abatement Technology—Multi-Mode Bypass* cases and approximately 41 percent higher for the *With No Plume Abatement Technology—No Plume Abatement* Impact cases. These higher social cost values reflect the increased cost and operating impact estimates for these cases as documented in the August 2003, *Cost Analysis.*

Id. at p. 5. EPA believes that its analysis of social costs is reasonable and conservative.

4. Additional Factors Considered

In exercising reasonable discretion in applying the wholly disproportionate cost test for the Draft Permit, EPA considered certain factors in addition to the benefits and costs discussed above. See § 7.7.5 of EPA's July 22, 2002, Permit Determinations Document. These included factors such as the effect that compliance costs at BPS might have on consumer electric rates, potential effects on the Region's energy supply, the economic benefit to the permittee from once-through cooling operation and delayed implementation of cooling system upgrades, and whether or not the compliance expenses would or would not be likely to put the plant out of business. EPA will not repeat its earlier evaluation here, and the Agency thinks the considerations expressed there have continued validity. EPA will, however, address certain points here due to updates in its analysis and in response to comments.

First, EPA will address the consumer rate effect issue. EPA's detailed analysis of this issue is presented in the August 20, 2003, Electricity Rate Impact Report, which is incorporated by reference herein and is more fully referenced above. This report also presents responses to comments EPA received from the permittee on the rate impact analysis conducted for the Draft Permit. EPA has updated its consumer rate impact analysis in response to updated estimates of the costs of compliance and in response to updated information obtained from the ISO-NE regarding (a) the distribution of electricity volume by ECP as observed in the ISO-NE hourly wholesale energy market; and (b) the fraction of total New England electricity consumption transacted through the ISO-NE hourly wholesale energy market. See *Id.* at p. 11.

While the rate effect numbers have gone up somewhat, they have not changed significantly, and the Agency's overall conclusion remains the same: Compliance with the permit's CWA § 316(b) requirements will not have a significant effect on consumer electric rates. As with the prior analysis, EPA has looked at both short-term rate effects resulting from construction-related generating unit outages and long-term effects resulting from increased production costs and slightly reduced generation due to the cooling system improvements. The long-term rate effect to the typical 500-kWh-per-month household from increased production costs and slightly reduced generation as a result of the cooling system improvements is conservatively estimated to range from $0.06 per month to $0.18 per month (figures are rounded up). See *Id.* at Table 9. EPA also conservatively estimates that generating unit construction outages would likely result in a short-term rate effect of $6.27 spread over 36 weeks (i.e., approximately $0.70 per month for just 9 months) for the typical 500-kWh-per-month consumer. See *Id.* at Table 8. EPA further notes that the 9 months of construction outage effect will not likely occur in a single, continuous period; it will more likely be broken into three shorter periods spread over two or more years. The analysis also indicates that even these figures are conservatively estimated and likely represent an overestimate of any effect. See *Id.* at p. 18. In addition, although EPA believes it more appropriate in this context to consider the rate effect on a household basis, in response to comments from the permittee, EPA also considered the potential ongoing rate impact on a total market basis. By comparing the estimated total annual additional retail outlay for New England electricity consumption associated with these potential rate increases ($13.4 million) with the total retail value of New England electricity consumption ($11.803 billion), EPA sees that the total additional retail outlay amounts to 0.11 percent of the total retail value consumed. See *Id.* at Table 10. EPA concludes that this effect is relatively insignificant. Again, the values used in this analysis are conservatively estimated and probably overstate any effect. See *Id.* at p. 19.

EPA notes that in the initial permit appeal decision by EPA Region 4 for *In the Matter of Carolina Power and Light Company (Brunswick Steam Electric Plant, Units 1 and 2)* (National Pollutant Discharge Elimination System Permit No. NC 0007064) (Decision by EPA Region 4) (November 7, 1977) (AR 3111), the Region also calculated the consumer electric rate impact of cooling tower conversion costs to comply with CWA § 316(b). In that case, the Region concluded that the "cost" of complying with these BTA requirements should be considered to be the consumer rate effect. The Region then concluded that the relatively small predicted rate effect of (approximately $0.77 to $0.85 per month in the first year) was "not wholly disproportionate to a 96 percent reduction in the severe adverse environmental impacts of the plant." *Id.* at p. 69. The adverse impacts assessed by the Region included significant entrainment and impingement damage. *Id.* at pp. 33–44. If Region 1 took the same approach in this case (i.e., applied the wholly disproportionate cost test by comparing the predicted rate effect of compliance with BTA measures with the percentage of entrainment and impingement reduction achieved), EPA would also conclude that the costs are not wholly disproportionate to the benefits. EPA believes, however, that its more-detailed consideration of costs in the application of the wholly disproportionate cost test, and its consideration of the rate effects as an "additional consideration" rather than **the** measure of cost, is reasonable and appropriate.

Second, EPA continues to conclude that compliance with the new permit will have no significant effect on the New England region's supply of electricity. No significant comments were raised to the contrary in response to its analysis for the Draft Permit. Matters related to this issue are discussed elsewhere in these responses to comments. Several commenters stated that the region's energy supply would be damaged if BPS either ceased operations or was precluded from burning coal as a fuel source. These commenters argued that burning coal was important for maintaining diversity in the region's "fuel mix" and/or for keeping electricity prices down, because coal is relatively cheap as compared to other major fuel sources (e.g., natural gas, oil). Other commenters disagreed that it was important for the region's energy supply for BPS to remain in operation as a coal-burning facility. These commenters argued that the Region has a more than adequate energy supply, that BPS could be replaced by new, modern generation if necessary to meet demand, and that the southeastern Massachusetts subregion is "export limited." EPA has discussed this issue elsewhere in tehse responses to comments, but the Agency does not need to resolve the conflict for this permit. EPA concludes that BPS will not close due to the cost of complying with this NPDES permit, and nothing about the permit will preclude the facility from continuing to burn coal if it chooses to do so. Indeed, the low production costs at BPS help to assure the facility's profitability and the strong likelihood that either the current owner of the plant, or some other company, will continue the plant's operation in the future.

In addition, as discussed previously, there will be only a small, insignificant loss in generation due to the expected operation of cooling towers at the facility. This loss is the result of a small reduction in plant efficiency and auxiliary power needs to operate the cooling towers. EPA has increased its estimate of auxiliary power needs somewhat, but the overall effect remains insignificant. Moreover, EPA continues to feel that it is an important benefit of cooling towers that BPS is likely to be able to generate **more** electricity during peak-demand hot weather periods when the region's supply is most severely tested. Again, this is because cooling towers will alleviate the problem of needing to reduce generation during such periods to remain within the permit's maximum discharge temperature limit.

A number of comments were submitted that raised several types of possible adverse community effects if BPS installed cooling towers to comply with the NPDES permit's limits. EPA's permit does not dictate the technology that BPS must use to comply with the new thermal discharge and cooling water intake limits; it only sets performance standards for these parameters, which the permittee can meet in any way it chooses. That being said, EPA has based its CWA § 316(b) BTA limits, as well as its § 301 BAT assessment, on the conclusion that retrofitting cooling towers at BPS would represent the best technology available. Therefore, the Agency has carefully considered these comments and assessed these issues, and they are discussed in greater detail elsewhere in this document as well as in EPA's July 22, 2002, Permit Determinations Document. First, with respect to possible traffic-safety concerns related to fog or ice from cooling tower water vapor emissions, EPA has explained its conclusion that the permittee has not substantiated, and appears to have overstated, this threat. EPA's conclusion continues to be that if further evaluation indicates that steps are needed to mitigate this concern, there are a number of methods of accomplishing such mitigation to ensure public safety (e.g., hybrid towers, enhanced roadway management, cooling tower bypass, unit shutdowns, combinations of these options). Moreover, EPA's cost evaluation conservatively takes the possibility of such mitigation into account, but it expects that the permittee can develop a less expensive approach to the problem, if any, when it focuses on optimizing its design and operational protocols.

EPA has also seen no evidence from public comments, or our own research, to suggest that air emissions from the cooling towers—which are, after all, a widely used technology—will otherwise cause health problems. Although this is not directly relevant to this Clean Water Act permit, EPA further notes that compliance with new Massachusetts air regulations will reduce the plant's air emissions of other pollutants such as particulate, sulfur dioxide, nitrogen oxides, carbon dioxide, and mercury, which, in turn, should help to address the many public comments expressing concern about the public health effects of air emissions from the combustion of coal at BPS. In addition, the evidence shows that salt drift emissions should be able to be controlled through the use of existing technology. These issues will be further addressed in the state's air quality review.

EPA has also considered the issue of noise from cooling towers and concluded that noise impacts can be adequately controlled. This issue will also be further addressed in the state permitting process to ensure that applicable standards are satisfied. EPA also considered aesthetic issues posed by adding cooling towers at the facility. The Agency respects and appreciates the concerns expressed by certain commenters about this point, but continues to conclude that the addition of cooling towers at this industrial site poses only a small additional impact that does not constitute a reason not to impose § 316(b) limits that will otherwise meet the Clean Water Act's requirements.

Finally, the Town of Somerset and various individual residents expressed concern about the social impacts that the Town would face if BPS shut down and ceased paying the Town the substantial tax revenues it has come to rely on. Other commenters objected to this constituting a relevant consideration for EPA, and pointed to the harm the facility has done to the area at large regardless of the tax benefits for Somerset. As EPA has explained, however, it does not believe the permit will cause BPS to shut down. Therefore, the Town's tax concern should not materialize. Furthermore, EPA does not believe that local tax revenue losses can constitute a reason to allow a facility to violate Clean Water Act requirements intended to protect natural resources that belong to the larger public.

E. Decision Concerning the Wholly Disproportionate Cost Test Under CWA § 316(b)

EPA's conclusions for the CWA § 316(b) determination for the Draft Permit are set forth in § 7.7.6 of EPA's July 22, 2002, Permit Determinations Document. Our conclusions for the Final Permit are similar, based on our consideration of public comments and our updated analyses in response to those comments. For the Final Permit, EPA has set the cooling water intake structure capacity limitation at 56 MGD, with an additional 6.847 billion gallons **per year** allowable for cooling tower bypass. In response to comments from the State of Rhode Island and others, however, EPA has have added the restriction that cooling tower bypass/once-through cooling operations cannot be used during the winter flounder spawning season (February through May), so as to avoid serious adverse environmental impact from entrainment/impingement during that time. The intake capacity limits are based on a retrofit of BPS with the Closed-Cycle Entire Station option, and EPA determines that these intake capacity limits reflect the BTA for minimizing adverse environmental effects.

In light of the above analysis, EPA also concludes that the cost of complying with the BTA-based permit limits is not wholly disproportionate to the benefits it would produce. EPA believes this to be the case whether its cost estimates (including its social cost estimate) or the permittee's cost estimates (including the permittee's undocumented social cost estimate stated by its attorneys, as referenced above) are considered, although the Agency believes its estimates are more reasonable and should be used. EPA recognizes that this conclusion depends on its assessment of the benefits of these permit limits, whereas the benefits assessment by the permittee would cut against this conclusion. EPA concludes, however, that its qualitative and quantitative (monetized and nonmonetized) assessment of benefits is reasonable and appropriate, whereas the permittee's approach, which included essentially no qualitative assessment and no estimate of nonuse benefits, is unreasonable.

EPA concludes that there will be great benefits from upgrading BPS's cooling system to utilize the well-established technology of mechanical draft wet cooling towers. Operation of the cooling water intake structure with the current open-cycle system, in combination with other stressors, such as the plant's thermal discharge and overfishing, has caused severe adverse environmental effects to the Mount Hope Bay estuary and, as a result, to the greater Narragansett Bay estuary of which it is a part. The intake kills vast numbers of individual organisms, takes significant percentages of the populations of certain species, and has contributed to the disruption of the balanced indigenous community of organisms that ought to exist in Mount Hope Bay. Severe adverse impacts are likely to remain from the options other than the Closed-Cycle Entire Station option, including the permittee's proposed permit limits based on its "Enhanced Multi-Mode" system proposal. The Closed-Cycle Entire Station option, on the other hand, will dramatically reduce these adverse effects by achieving an approximately 96 percent reduction in entrainment and impingement and will help to give the fishery a chance to recover to a healthy state. Other stresses on the fishery will also be addressed by this permit (thermal discharge), or have been addressed or are being addressed by other public actions underway (controlling overfishing, CSOs). This option will achieve a far greater reduction in adverse impacts than the other options under consideration (e.g., the permittee proposes only a 1/3 reduction) and achieves the requirement to minimize adverse environmental impacts.

As discussed above, compliance with the new permit's § 316(b) limits will have major benefits whether they are evaluated from a qualitative, a quantitative/nonmonetized, or a monetized standpoint. Indeed, given the impossibility of fully monetizing all the benefits of these environmental improvements, it is reasonable and appropriate to consider all these perspectives together. These permit limits will achieve very substantial reductions in the number of organisms and the percentages of species populations entrained and impinged (e.g., winter flounder), by the power plant. According to the analysis by EPA and many commenters, these reductions will also help, along with other steps being taken, to give the overall population a chance to recover. The limits proposed by the permittee would achieve much less in the way of reduced entrainment and impingement impacts and would not, according to EPA and many commenters, be sufficient to allow the recovery of the fishery.

These benefits are extremely important from a qualitative standpoint considering the importance of the natural resources involved. For example, as EPA has explained, the estuarine waters of Mount Hope Bay should provide a productive nursery habitat for the Narragansett Bay estuary, a federally designated estuary of national significance. These waters have also been classified as SA and SB waters by both Massachusetts and Rhode Island, and the designated uses of these waters include providing "excellent fish habitat" and a recreational fishing resource. These benefits are also very substantial from a quantitative, nonmonetized perspective. The permit limits will result in an approximately 96 percent reduction in entrainment and impingement, and large reductions in the percentage of species populations taken by the plant. These reductions will help allow the fishery a chance to recover. The permit limits proposed by the permittee will achieve much lesser reductions and, in EPA's estimation, will not be sufficient to help facilitate the recovery of the fishery.

Finally, EPA's monetized estimate of the benefits of the permit also reveals very substantial benefits. EPA has estimated the total (use and nonuse) benefit of compliance with the permit's CWA § 316(b) limits to be $23.4 million per year (2002$) discounted at 3 percent (and rounded off). It should be understood that this estimate is simply based on the aquatic habitat improvements expected to result from reduced entrainment and impingement losses as a result of these permit limits, and does not depend on an assessment of whether or not these limits are needed to allow the recovery of the overall fishery. Furthermore, as discussed elsewhere, this estimate is conservative in many respects. It also does not attempt to monetize the benefit of thermal discharge reductions, ignores the entrainment of organisms other than fish (invertebrates, crustaceans), and may fail to fully appreciate various ecological benefits of reducing the entrainment of all of these life forms. As a result, it is important to consider this monetized estimate together with the nonmonetized evaluations discussed above. The Agency believes its benefits assessment is reasonable and appropriate. EPA recognizes that it is not a precise estimate, but a precise estimate is neither possible nor required under CWA § 316(b).

EPA believes that the above assessment is also supported by the results of its Habitat Restoration analysis as modified in response to comments. The Agency's updated analysis conservatively estimates public willingness to pay for environmentally sound restoration projects to produce numbers of fish equivalent to those that would be saved by the new permit limits. From this analysis, EPA estimated a range of public willingness to pay for the necessary restoration projects of $11.7 million per year (2002$) (for counties abutting Mount Hope Bay) to $18.8 million per year (2002$) for all households within 32.43 miles of Mount Hope Bay. These willingness to pay values neither represent all of the organisms lost to I&E nor all the species that could benefit from wetland and eelgrass restoration. These values also assume that no households outside the two groups noted above hold any value for preserving the natural resources in question. This is unlikely to be true. These estimates, therefore, are likely to represent lower-bound values. It should also be underscored that this evaluation did not determine the feasibility and effectiveness of specific restoration projects at specific sites or involve a determination that such projects could be effective for fishery restoration within Mount Hope Bay without substantially reducing entrainment and impingement by BPS. Instead, the consideration of restoration was general in nature. Thus, while the HRC analysis for the Draft Permit indicated that it would cost society more than $28 million per year (2002$) to implement ecologically sound restoration projects to restore the number of fish lost to BPS's cooling water intake structures, and the current analysis conservatively indicates a public willingness to pay of from $11.7 million to $18.8 million per year (2002$) to undertake such restoration, the loss of these organisms could be prevented in the first place by implementing the Closed-Cycle Entire Station option at a similar cost.

EPA also concludes that the permittee's benefits assessment is extremely incomplete. It only includes use values, and incomplete use values at that, as discussed elsewhere. It estimates **no** nonuse values and does not account for benefits from a qualitative or other type of nonmonetized perspective, except perhaps to the extent that the permittee broadly argues in various parts of its comments that the permit limits will make no difference for the fishery and, therefore, are not worth the expense. EPA believes an approach to assessing benefits that is limited solely to use values is incomplete and is not reasonable in the context of developing these CWA § 316(b) permit limits.

In light of the uncertainties surrounding the development of benefits estimates, EPA also conducted a "break-even" analysis. Its results support the reasonableness of our approach and the unreasonableness of the permittee's approach. The break-even analysis is presented in the Memorandum from Elena Besedin and Ryan Wardwell, Abt Associates, Inc., to Mark Stein, U.S. Environmental Protection Agency Region 1, "Non-Use Benefits Break-Even Analysis for Brayton Point" (September 19, 2003). EPA worked with Abt Associates on the development of this analysis, independently considered it, and adopted and incorporated it by reference into these responses to comments. Based on two of EPA's higher estimates of the social cost of compliance with the new CWA § 316(b) permit limits, EPA estimated what household nonuse benefit values would have to be for the affected population in order to be even with those costs. These offsetting values were **less than** the per household figures calculated in the Meta-Analysis, which tends to support the conclusion that the costs are not wholly disproportionate to the benefits (see Table 4). At the same time, if benefit values were limited only to the use values, as the permittee favors, the numbers would suggest that BPS could eliminate more than three times the entire recreational and commercial winter flounder landings for all of Rhode Island, and it would still not be worth it, in the permittee's estimation, to reduce the plant's impacts. If the permittee's cost estimates were used for this analysis, the percentage of the total winter flounder landings that the plant could take before justifying the new permit limits would be even higher. This result suggests that the permittee's analysis is lacking from a public policy perspective.

The total costs of compliance with the permit's CWA § 316(b) limits have been estimated by both EPA and the permittee. These values are also not precise, but again precision is neither possible at this stage nor required under CWA § 316(b). EPA's total private cost estimates range from (a) a low value of $12.2 million per year (2002$), assuming a 30-year useful life for equipment, and the option assuming no modifications for plume abatement and no actual plume abatement outages needed (the annualized value for this option was $13 million (2002$), assuming a 20-year useful life, while the total present value cost over the life of the equipment was $88.3 million (2002$), to (b) a high value of $17.6 million (2002$) per year assuming a 20-year useful life and the hybrid cooling tower option[24] (the total present value for this

[24] As discussed elsewhere in these responses to comments, EPA also considered the possible need for additional noise mitigation and the potential cost for such measures. EPA did not end up adding any additional cost for noise mitigation to its capital cost estimates for several reasons. EPA's contractor, Abt Associates, Inc., also determined that adding the highest noise mitigation cost estimate to EPA's highest total cost estimate would increase the total present value (and annualized costs) only by approximately 8 percent (see AR 3215). Even if these costs were included, it would not alter our conclusion concerning the wholly disproportionate cost test.

scenario was estimated to be $119.7 million (2002$)) (assuming a 30-year useful life of equipment, the annualized cost was $16.6 million and the total present value cost was $120.2 million (2002$). Translating these costs into a social cost estimate, EPA found estimated social costs to range from (a) low values of $12.1 million per year (2002$) (with a corresponding total present value of $149.6 million (2002$)) for the no plume abatement technology option, assuming no plume abatement effects and a 30-year equipment life (assuming a 20-year equipment life, the corresponding values are $13.7 million per year and $145.3 million total present value (2002$)), to (b) a high value of $18.5 million per year (2002$), assuming a 20-year equipment life for the option involving no technological modification for plume abatement but 100 percent of the permittee's predicted plume effects (the corresponding total present value figure is $195.6 million (2002$) (the corresponding values assuming a 30-year equipment life are $16.8 million per year and $208.4 million total present value (2002$)).[25] EPA believes these estimates are reasonable and appropriate.

EPA also believes the permittee has overestimated the costs of compliance with the new permit limits. The permittee also has not provided social cost estimates. The permittee's private cost estimates range from (a) a low value of an annualized cost of $36.7 million (2002$) assuming a 20-year equipment life, a discount rate of 15 percent, and no plume abatement modifications and 100 percent of the permittee's predicted plume effects (the corresponding total present value figure is $229.8 million (2002$), to (b) a high value of an annualized cost of $56.8 million (2002$) assuming a 20-year equipment life, a discount rate of 20 percent, and use of hybrid cooling towers to address vapor plume effects (the corresponding total present value figure is $276.8 million (2002$)). The corresponding social cost figures would be higher, but the permittee did not provide estimates.

EPA's conservative analysis also concludes that the proposed improvements at BPS would have an insignificant effect on consumer electric rates. Furthermore, retrofitting BPS with the Closed-Cycle Entire Station option should not harm the Region's overall energy supply and offers some potential benefits during the peak hot weather demand periods. The option is affordable for the permittee and, although it will reduce the value of the plant, the facility should continue to make substantial profits for its owners. Moreover, while the facility raises some nonwater environmental issues for local residents (e.g., vapor plume, noise), EPA concludes that these issues can be controlled, and they will be further addressed in the future state permitting process and the plant's future, more-detailed design work.

Taking all of the above into account, EPA concludes that the costs of complying with the permit's BTA-based CWA § 316(b) limitations are **not** wholly disproportionate to the benefits of doing so. Such compliance is also technologically and economically practicable. It is also a necessary step, in conjunction with other measures being taken, to allow the recovery of the ecosystem of the Mount Hope Bay estuary and its fishery. The Agency is bolstered in its conclusion by the knowledge that both the Commonwealth of Massachusetts and the State of Rhode Island share its views regarding the appropriateness of the permit limits.

Thus, EPA concludes that the proposed permit limits will satisfy CWA § 316(b). As discussed elsewhere, the Agency also concludes that these limits will satisfy state water quality standards and CWA §§ 301(b)(1)(C), 401(a)(1) and 401(a)(2). EPA also notes that these limits have been certified by the Commonwealth of Massachusetts as satisfying the Massachusetts Coastal Zone Management program as required by the Federal Coastal Zone Management Act. 16 U.S.C. § 1456(c). Further, as concluded by the

[25] The social cost estimates for hybrid cooling towers were somewhat lower than the high EPA estimate described in the text. Assuming a 20-year useful equipment life, the annualized value was $17.9 million, with a total present value of $189.9 million (2002$). Assuming a 30-year equipment life, the annualized value was $15.8 million, with a total present value of $196.1 million (2002$).

National Marine Fisheries Service, these permit limits will satisfy the Magnuson-Stevens Fishery Conservation and Management Act's requirements pertaining to "Essential Fish Habitat."

13. Comment

The permittee disagreed with EPA's statement in § 7.6.3b of the July 22, 2002, Permit Determinations Document that a detailed discussion of the economic theory underlying various methods of estimating monetized benefits of environmental resources was not necessary for this permit determination. Citing *Appalachian Power Co.* v. *EPA*, 251 F.3d 1026 (D.C. Cir., 2001), the permittee asserted that such a position is "flatly inconsistent with administrative precedent, which requires EPA to justify its choice of models and to explain why it chooses the results of one model over the results of a different model."

Response

EPA agrees with the permittee that it is necessary for the Agency to identify, explain, and justify in a reasonable manner the analytical methods it uses in an NPDES permit analysis. EPA's discussion of its economic analyses for this permit, however, was more than adequate.

EPA provided detailed discussion of our economic analysis in §§ 7.6 and 7.7 of the July 22, 2002, Permit Determinations Document. In addition, EPA provided to the public a number of documents prepared by our expert consultants that provide further, in-depth discussion of the Agency's economic analyses. These materials provide a more than adequate explanation of the analytical methods chosen, their theoretical underpinnings, the reasons EPA chose them, and their results. It is clear from these documents that EPA has carefully examined the relevant data, chosen reasonable, appropriate methodologies that are rationally related to this data, and articulated detailed explanations of its economic analyses. EPA is not obliged to write a treatise on natural resource economics to support this NPDES permit. To the extent the permittee argues that EPA should have provided an even more detailed discussion of its economic analyses than it did, EPA believes such a demand is unreasonable and without legal basis.

In support of its comment, the permittee cites to *Appalachian Power Co.* v. *EPA*, 251 F.3d 1026 (D.C. Cir., 2001). Yet, this case is inapposite to the present case. In *Appalachian Power*, the petitioners challenged EPA's use of economic growth factors generated by a widely used utility planning model (the "IPM") to estimate the amount of NOx emission reductions that upwind states could achieve through "highly cost-effective" means. In its analysis, EPA used the IPM to generate growth assumptions for a span of years but used a different set of data for one particular year without offering an explanation for its choice. The court stated that "[e]ven if the EPA finds on remand that its choice was the better one, failure to 'examine the relevant data and articulate a satisfactory explanation for its action' either is arbitrary decisionmaking or at least prevents a court from finding it non-arbitrary." 251 F.3d at 1034 (quoting *Motor Vehicle Mfrs. Ass'n* v. *State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983)). In this case, EPA has not made the mistake found by the court in *Appalachian Power*. We also point out that the court in *Appalachian Power* underscored that "agency determinations based upon highly complex and technical matters are 'entitled to great deference,'" *Id.* at 1035 (citations omitted), and that "EPA has 'undoubted power to use predictive models,'... but it must 'explain the assumptions and methodology used in preparing the model'...." *Id.* (quoting *Small Refiner Lead Phase-Down Task Force* v. *EPA,* 705 F.2d 506, 535 (D.C. Cir., 1983) (citations and internal quotation marks omitted)). The court further observed that, "EPA has sufficient discretion to use the IPM model in the first instance even if states believe that some other state-specific modeling is more accurate ..., [and that w]hen it comes to these sorts of technical matters, the EPA is entitled to great deference" *Id.* at 1037 (citing *Environmental Action, Inc.* v. *FERC,* 939 F.2d 1057, 1064 (D.C. Cir., 1991)). Finally, the court observed, "[i]t is only when the model bears no rational relationship to the characteristics of the data to which it is applied that we will hold that the use of the model was arbitrary and capricious." *Id.* (quoting Appalachian Power Co. v. EPA, 135 F. 3d 791, 802 (D.C. Cir., 1998)). The critical problem in Appalachian Power was that the agency had not provided an explanation for the manner in which it used the particular technical model. The facts of that case are clearly distinguishable from those in the present case, in which EPA explained its analytical approaches and the data it used in substantial detail.

14. Comment
The permittee stated that EPA's biological assessment of the benefits of closed-cycle cooling is flawed, and that the resulting comparison of costs and benefits is therefore unsound. The permittee stated that EPA's biological analysis "grossly overstates" both the losses associated with BPS's cooling water intake system (entrainment and impingement) and the benefits to be obtained from retrofitting the plant with a closed-cycle cooling system.

Response
EPA disagrees with the permittee's complaints regarding the Agency's biological and economic analyses. The permittee states that EPA's biological analysis grossly overstates the losses associated with BPS's cooling water intake system, pointing to two major concerns with EPA's analysis: (a) the assumption of 100 percent mortality for entrained and impinged organisms; and (b) the use of data from 1974–1983, before the major decline of fish stocks in Mount Hope Bay. These issues are addressed below.

In Chapter 7 of EPA's July 22, 2002, Permit Determinations Document, the rationale for assuming 100 percent mortality for entrained and impinged organisms is discussed. Studies of entrainment and impingement survival done at numerous power plants have shown mortality rates to be highly variable from species to species and from plant to plant (EPRI, 2000). Consultants for the permittee produced a site-specific study to examine entrainment survival at BPS. The design of this study was not coordinated with EPA or other members of the BPS Technical Advisory Committee (TAC) prior to its initiation or completion. Ultimately, the permittee submitted a report for entrainment survival in 1997–98. Members of the BPS TAC and scientists from the U.S. Department of Energy (providing services to EPA under an interagency agreement) reviewed this report and found several significant flaws in the experimental design of the study. These flaws were considered of such gravity as to invalidate the study's conclusions. The specific flaws are discussed in EPA's July 22, 2002, Permit Determinations Document (p. 7-111–112). With no compelling plant-specific evidence to the contrary, and in light of the status of the resources in Mount Hope Bay, EPA feels it is justified in making the assumption of 100 percent mortality for organisms entrained at BPS. This assumption may be conservative, but it is reasonable under the circumstances.

The permittee also provided data on impingement survival for the intake at Unit 4. Unit 4 has angled screens, a lower intake velocity and a low-pressure screen wash, which represent superior technology for promoting impingement survival as compared to the intakes at Units 1, 2, and 3. Thus, EPA did not feel it was appropriate to extrapolate initial impingement survival rates from a study done at Unit 4 to the intakes at Units 1, 2, and 3. Finally, impingement studies do not tend to assess the condition of survivors or examine long-term survival, and the study at BPS did neither. A fish that has been injured due to an impingement event may have a lower life expectancy than a healthy individual of the same species. EPA did not receive any compelling information as to why impingement mortality should be significantly less than 100 percent. As a result, and in light of the dire condition of the resources in Mount Hope Bay, EPA also concluded that the conservative assumption of 100 percent mortality is reasonable and justified.

EPA's analysis here relied on entrainment and impingement data from 1974–1983. The rationale for use of this data is discussed in EPA's July 22, 2002, Permit Determinations Document (p. 7-108). The permittee states that EPA should use more recent data for its analysis of entrainment and impingement losses. EPA disagrees. BPS stopped its entrainment monitoring program in 1985. It reinitiated sampling in 1993, but only for winter flounder. That sampling is conducted between February and mid-May. To ensure a complete, consistent, and comprehensive dataset, EPA considered a time period when both entrainment and impingement data was collected for all species.

Additionally, EPA feels that it is appropriate to assess losses from before the collapse of finfish stocks in Mount Hope Bay. EPA believes that operations at BPS, including the conversion of Unit 4 to open-cycle cooling, has been a significant contributor to the collapse of fish populations in Mount Hope Bay. If the Agency were to have considered post-collapse entrainment and impingement data, which is not available for most species anyway, the net effect would have been to understate the impact of BPS by making the absolute numbers of entrainment and impingement losses smaller. Such an approach would provide a misleading picture of the adverse effects of cooling water intake operations. It would also have resulted in skewed, correspondingly lower estimates of the economic benefits that can result from installing various control technologies. Basing an evaluation solely on consideration of post-collapse finfish data could arguably lead to a vicious downward spiral, where, as resources decline, the depleted resource is used as an economic justification for refusing to restore or protect the resources in the first place. Furthermore, as discussed elsewhere, some data suggests that fish populations were already having problems by 1974, and that populations may have been larger before data collection began in 1972. In light of all of the above, EPA believes its use of the 1974–1983 data was reasonable and appropriate in this case.

15. Comment

The permittee stated that EPA's assessment of costs and benefits is unsound because: (a) EPA's calculation of "production foregone" due to entrainment and impingement fails to use current data and contains critical errors which "grossly inflate" the estimate; (b) Region 1's analysis incorrectly assumes that no organisms survive either impingement or entrainment; and (c) Region 1 erroneously calculated the size of the winter flounder population and the level of population impact caused by BPS's operations over the years, instead of accepting BPS's "Empirical Transport Model" estimate. The permittee supported these statements by citing to the comments of its consultants LMS and Raymond Hilborn (July 2002).

Response

The permittee argued that EPA's production foregone estimates were inflated because EPA used fish weights at the midpoint of an age category rather than at the beginning. Ideally, using initial weights of fish in an age category may be preferable. Such data, however, was generally unavailable. EPA's approach, therefore, was reasonable and appropriate.

It is also important to note the relative role that the estimate of production foregone plays in EPA's benefits analysis. EPA does not assign specific benefits to production foregone **per se**. Rather, production foregone is valued indirectly with a trophic transfer model that relates foregone forage production to foregone harvest. The foregone harvest estimates are combined with estimates of adult equivalent losses from entrainment and impingement losses of harvestable species. This calculation produces relatively small benefits estimates, only in the thousands of dollars. Thus, while the permittee may have pointed out some incorrect biological assumptions and/or clerical errors in the estimates of size at age for certain life stages of some species, EPA assessed the import of these errors and found them to be insignificant with respect to the final benefits assessment. In any event, these errors were corrected for the Final Permit analysis.

The issue of entrainment/impingement survival is discussed in detail elsewhere in these responses to comments.

EPA's estimate of the level of the impact to the winter flounder population in Mount Hope Bay is based on a number of elements. As stated above, EPA assumes 100 percent mortality for organisms that are entrained or impinged at the facility. Again, our rationale for doing so is discussed in EPA's July 22, 2002, Permit Determinations Document and in other responses to comments included in this document. EPA also used BPS's recent estimates of winter flounder entrainment and impingement losses and assumes these are accurate. EPA also notes that the BPS estimate is likely an **underestimate** of the true quantity of eggs and larvae entrained by the power plant because BPS collects entrainment data only from

February to mid-May, whereas Keller et al. (1999) document larval winter flounder in the water column through June.

In EPA's calculation, it is implicitly assumed that 100 percent of the eggs and larvae are generated in Mount Hope Bay. For eggs this is a fair assumption, as they are demersal and adhesive and probably do not travel significant distances in the environment. For larvae this assumption is less certain. Winter flounder larvae are pelagic and have varying degrees of ability to maintain their position in the water column. Thus, the exchange of water between Mount Hope Bay and Narragansett Bay likely allows for some exchange of fish larvae as well. Neither the current nor historical net flux of winter flounder larvae into or out of Mount Hope Bay is known.

If the net flux of larvae is currently **out of** Mount Hope Bay, then the assumption that 100 percent of the eggs and larvae lost at BPS have been generated in Mount Hope Bay would hold true. If the net flux of larvae is currently **into** Mount Hope Bay, then the following may be true by extension: BPS is taking all of the larvae generated in Mount Hope Bay and some quantity of the larvae from Narragansett Bay. Thus, BPS would be having some measurable impact on Narragansett Bay as well as Mount Hope Bay.

Due to the presence of four rivers flowing into the northern portion of Mount Hope Bay, the net flux of water is out of Mount Hope Bay. It is fair to assume that no significant quantity of winter flounder larvae are being added to Mount Hope Bay from the freshwater inputs to the north. Unless there are areas of Narragansett Bay with significantly greater concentrations of flounder larvae that feed into Mount Hope Bay, it is reasonable to assume that Mount Hope Bay does not benefit from a substantial net input of larvae from Narragansett Bay. Keller et al. (1999) examined ichthyoplankton concentrations in Narragansett Bay in 1989–1990 and found them to be dramatically lower than comparable concentrations from 1972–1973, and did not find any statistical differences between specific areas of the bay. The waters in Narragansett Bay immediately adjacent to Mount Hope Bay did not have significantly higher concentrations of winter flounder larvae compared to other parts of Narragansett Bay or Mount Hope Bay (MRI data for Mount Hope Bay). In lieu of any evidence to support the idea of a substantial net input of winter flounder larvae from Narragansett Bay, EPA feels that it is reasonable to stay with the assumption that 100 percent of the entrained eggs and larvae are of Mount Hope Bay origin.

The final piece of this calculation is the estimate of the winter flounder population in Mount Hope Bay. Fish population estimates tend to produce results with a high amount of variability. Mark Gibson (Rhode Island DEM), in an attempt to mitigate this variability, used five different methods to derive a pre-1984 winter flounder population estimate of 300,000 fish. These approaches are described in Chapter 7 of EPA's July 22, 2002, Permit Determinations Document. Gibson then used the MRI trawl survey winter flounder abundance data as a "scaler" to estimate a present-day winter flounder population size of a few thousand fish. EPA made an adjustment to Gibson's analysis to assure consistency in the time frames of the Mount Hope Bay population estimates and the entrainment and impingement loss estimates. This adjustment raised the Mount Hope Bay winter flounder population estimate to approximately 7,500 fish.

The permittee's consultant, Raymond Hilborn, has presented analyses suggesting a current winter flounder population in Mount Hope Bay in excess of 300,000 adults. Hilborn uses impingement rates from BPS to establish an abundance estimate per unit area in "upper Mount Hope Bay" (defined by another of the permittee's consultants, Joseph DeAlteris, as the 5 square miles nearest the power plant). He then uses the state of Rhode Island's trawl survey data to establish an abundance estimate for the lower 9 square miles of Mount Hope Bay. In addition, he uses an estimate of Narragansett Bay winter flounder concentrations by Mark Gibson to derive a comparable estimate for Mount Hope Bay. Hilborn justifies the latter approach by inferring that the permittee's Wilcox Trawl (MRI) survey has shown no difference in winter flounder abundance between upper Mount Hope Bay, lower Mount Hope Bay and upper Narragansett Bay.

EPA has discussed in detail elsewhere in these responses to comments the flaws of using impingement rates as a quantitative measure of fish abundance in the receiving water. That discussion will not be repeated here. Additionally, EPA questions the representativeness of the Rhode Island trawl survey for lower Mount Hope Bay. This is also discussed elsewhere in these responses to comments and again, for the sake of brevity, EPA refers the reader to that discussion rather than repeating it here. Commenting specifically on the last approach described above, however, EPA also questions reliance on the Wilcox Trawl survey to support the idea of equal densities between its sampling locations. The Wilcox Trawl survey has a limited number of stations and is a relatively short-lived data series. Indeed, Hilborn does not use the Wilcox Trawl survey results to estimate abundance due to the short duration of the dataset. Additionally, this approach ignores the more statistically robust data used by Gibson (1996) in his analysis that does show a statistical difference in winter flounder abundance between Mount Hope Bay and Narragansett Bay. The permittee's consultant, Joseph DeAlteris, concedes that there is a measurable plant impact in upper Mount Hope Bay. Thus, the assumption of equal densities of winter flounder in all three areas is not supported, and the net result of making this assumption is to overestimate winter flounder population numbers in Mount Hope Bay.

In assessing the likely accuracy of any modeling estimate, it is important to reconcile the model estimate with actual observations and data. Current Mount Hope Bay winter flounder abundance in all trawl surveys remains extremely low, with the MRI standard trawl catching less than one winter flounder per tow, the MRI Wilcox Trawl (which catches a greater size range of fish than the standard trawl) catching approximately one winter flounder per tow (Scherer, pers. comm., 2003), and the Rhode Island Trawl survey currently catching less than 1 winter flounder per tow (Lynch, pers. comm., 2003). If the Agency accepts Hilborn's estimate of 300,000 and assumes that the fish are evenly distributed throughout Mount Hope Bay, then there would be 300,000 fish/390,000,000 square feet (area of 14 square miles converted to feet). This would result in 0.00077 fish per square foot. The MRI and Rhode Island trawl surveys each cover 60,000 square feet per tow. Thus, based on these figures, they should be catching 46 winter flounder per tow (60,000 X 00077 = 46). The current low catch rates seem to contradict the large population numbers predicted by Dr. Hilborn.

EPA looked at possible explanations for this large discrepancy.

1. *Fish are present, but the trawls are inefficient samplers*. There is no question that trawls do not collect 100 percent of the fish present in their path. Catch efficiency of trawls is highly species-specific. MRI assumes a catch efficiency of 50 percent for winter flounder with their gear (Scherer, pers. comm., 2003). Rhode Island DEM assumes a catch efficiency of 75 percent for flatfish with their gear (Lynch, pers. comm., 2002). For Hilborn's estimate to be correct, the trawl surveys would need to be catching 1 winter flounder for every 47 present, or a catch efficiency of only 2 percent. This seems very unlikely. Moreover, limited observational data by EPA scuba divers south of Spar Island near the location of the Rhode Island trawl station did not find any winter flounder. Additionally, commenters on the permit indicate that recreational anglers stopped fishing in Mount Hope Bay for winter flounder years ago due to the lack of success in catching anything.

2. *Fish are present, but not evenly distributed*. It is possible that winter flounder are present, but no longer occur at the fixed trawl station locations. Yet, they did occur at these locations in the past, as evidenced by pre-1984 catch data. Furthermore, although both Rhode Island and MRI select random trawl locations throughout Mount Hope Bay in addition to their fixed station efforts, neither of these programs have identified significant aggregations of winter flounder abundance in other areas of Mount Hope Bay. No convincing reason has been provided regarding why fish would have left these areas.

Of course, data from the fixed station surveys **does** suggest that winter flounder are not evenly distributed throughout Mount Hope Bay. There appears, instead, to be a pronounced preference for water more than

20 feet in depth. Both MRI, which has a deep water station in front of the BPS Taunton River intake, and Rhode Island, which has a deepwater station near Roger Williams College, show significantly greater numbers of winter flounder in the deep water sites as compared to the shallow water sites. Both programs report nearly 80 percent of their winter flounder catch coming from their deep water stations. The Rhode Island monthly program involves two stations, one deep and one shallow. The MRI program has six stations, with five shallow and one deep. With the preponderance of the sampling effort in shallow water, it is highly unlikely that this preference for deeper water is occurring strictly by chance. Review of similar depth preferences by winter flounder for upper Narragansett Bay in the Rhode Island survey show a slight preference for shallow water, with the catch in shallow water constituting 60 percent. The difference in relative depth distribution between Mount Hope Bay and Narragansett Bay is statistically significant. Combining this pronounced preference for deeper water by winter flounder in Mount Hope Bay (i.e., 80 percent) with Hilborn's population estimate of 300,000 would result in 240,000 of those winter flounder residing in deep water. EPA has conservatively estimated that 64 percent of Mount Hope Bay is shallower than 18 feet in depth. The trawl programs define shallow water as 20 feet in depth or less, thus 64 percent would be an underestimate of the actual percentage of "shallow" water. As discussed above, Hilborn's population estimate would conservatively result in approximately 240,000 fish occurring in 36 percent of the area of Mount Hope Bay (i.e., 14,040,000 square feet). This would translate to an approximate winter flounder density of 0.017 fish per square foot in the deep water. Thus, a deep water tow, which covers 60,000 square feet of area, should encounter over 1000 winter flounder. Currently, the deep water tows done by MRI and Rhode Island catch flounder at rates two orders of magnitude less than this (Scherer, pers. comm., 2003; Lynch, pers. comm., 2003).

Finally, Hilborn did not dispute the decline of fish populations in Mount Hope Bay in 1984. Accepting his post-collapse winter flounder population estimate of 300,000 fish, and accounting for the 88 percent decline detected by the MRI trawl survey, would translate to a predecline winter flounder population of almost 3 million adult winter flounder. Assuming the fish were evenly distributed within Mount Hope Bay, this should result in catch rates of over 460 winter flounder per tow. Assuming a preference for deeper water as discussed above, it would result in greater than 10,000 winter flounder per tow in the deep water stations. Yet, actual winter flounder catch rates in Mount Hope Bay from the precollapse period (i.e., pre-1984) were at least a factor of 10 less than these estimates.

Based on our disagreements with the assumptions (e.g., use of impingement data as an indicator of abundance, division of Mount Hope Bay as detailed by DeAlteris) that Hilborn feeds into his model, and the inability to marry his population model estimates with actual observed data, EPA believes that Hilborn's estimate of 300,000 adult winter flounder currently in Mount Hope Bay substantially overestimates what is actually there.

Gibson, MR. 1996. Comparison of trends in the finfish assemblage of Mt. Hope Bay and Narragansett Bay in relation to operations at the New England Power Brayton Point Station. RI Division Fish and Wildlife Research Reference Document 95/1.Revised August, 1996.

Keller, A.A., G. Klein-MacPhee and J. St. Onge Burns. 1999. Abundance and distribution of ichthyoplankton in Narragansett Bay. Rhode Island. 1989-1990. Estuaries. Vol. 22, No.1. pp 149-163.

16. Comment

The permittee stated that EPA indicated in its July 22, 2002, Permit Determinations Document that a 26 percent loss of Mount Hope Bay winter flounder as a result of entrainment and impingement by BPS would be "acceptable."

Response
EPA disagrees. The permittee mischaracterizes the Agency's analysis. EPA never stated that a 26 percent loss (or any other particular percentage loss) of the Mount Hope Bay winter flounder population to entrainment and impingement by the BPS cooling water intake would be "acceptable." Rather, EPA's July 22, 2002, Permit Determinations Document merely calculates the percentage loss that would remain from intake flows associated with the entire station closed-cycle cooling option. Control technologies that would reduce the flow even further (e.g., dry cooling) were deemed, however, not to have been demonstrated to be practicable from an engineering standpoint for a retrofit to a large, existing power plant with open-cycle cooling. (The permittee has indicated support for this conclusion.) This did not, and does not, constitute an endorsement of a 26 percent loss of the Mount Hope Bay winter flounder population as being "acceptable" to EPA. Moreover, as EPA has discussed elsewhere in this document, the Agency believes that the environmental improvements required by the permit, together with other actions being taken (e.g., fishing restrictions), will help bring about the recovery of populations of winter flounder and other species. As this recovery develops, the percentage of the winter flounder population lost to entrainment and impingement at BPS will necessarily go down. Thus, the 26 percent figure is not an "acceptable" level to EPA, but it also is not a figure that EPA believes will apply over time.

17. Comment
The permittee stated that "wholly disproportionate" is not the correct legal standard for evaluation of costs. But even applying that standard, the permittee stated, the cost of retrofitting all four units at BPS with closed-cycle cooling are "wholly disproportionate" to the benefits of such a retrofit. Specifically, the permittee stated that the present value of the cost of a full-station retrofit, including both installation and yearly operating costs, is $236 million, while the present value of the benefits over the life of the technology is $440,000—a cost-to-benefit ratio of 537:1. The permittee stated that, according to Region 4's 1991 "Guidance on § 316(b) Issues," a ratio of 10:1 will be considered wholly disproportionate, and that this is consistent with the Department of Interior's determination of the point at which restoration costs would be considered "grossly disproportionate" and therefore not recoverable as natural resource damages (citing 61 FR 20,560, 20,602 9 (May 7, 1996)).

Response
EPA disagrees that "wholly disproportionate" is not the correct legal standard for evaluation of costs under CWA § 316(b). Although there is nothing on the face of the statute indicating that costs should be considered at all, EPA has long interpreted CWA § 316(b) to bring economic considerations to bear in two ways: (a) the cost of measures to meet BTA requirements should be economically practicable, and (b) the costs of BTA measures should not be "wholly disproportionate" to their benefits. See July 22, 2002, Permit Determinations Document, §§ 7.2.5e, 7.7.2.

EPA also disagrees with the permittee's estimates of costs and monetized benefits. The Agency has concluded that the permittee overestimates the costs, unreasonably underestimates monetized benefits, especially by counting no nonuse values, and inappropriately ignores or understates the nonmonetized benefits of the environmental improvements required by the permit's CWA § 316(b) permit limits. EPA's assessment of costs and benefits is discussed in detail above and elsewhere in this response to comments document as well as in Chapter 7 of EPA's July 22, 2002, Permit Determinations Document.

In addition, the sources cited by the permittee are not binding on the Agency's application of the wholly disproportionate cost-to-benefit test under CWA § 316(b). As discussed in the material cited above, EPA has discretion to reasonably determine when costs are wholly disproportionate to the benefits of complying with BTA-based permit limits in a particular case based on the facts of that case. Exactly where to draw the line might vary in different cases based on factors such as the overall health of the fishery, the nature of the water body being impacted, and perhaps other factors. A ratio of 10:1 might be appropriate in certain cases, but there is no legally binding requirement that EPA use such a ratio. EPA notes that the permittee indicates that it believes a 10:1 ratio should be used in applying the wholly disproportionate cost-to-benefit test. The EPA document that the permittee refers to as a “guidance” document are only some notes prepared by an employee of EPA Region 4 in 1991 (AR 2136). This EPA Region 4 document is titled, “Some Specific Comments on CWA § 316(b) Issues.” The author states that:

> [t]here are no published EPA guidelines relating to what constitutes wholly disproportionate; however, a factor of 10 or more may be a reasonable factor to be used. That is, expenditures of perhaps 10 times the annual environmental damage might be a reasonable basis for evaluation. Using present economic factors this could equate to an expenditure of $150 million or more in capital costs per million dollars in annual environmental damage.

While this discussion is of interest, it does not appear that this suggestion that a 10:1 ratio “may be reasonable” was intended to create a binding requirement for all cases. Moreover, a legally binding requirement cannot be created in a “guidance document” that has not undergone public notice and comment. It is also worth noting that this 10:1 ratio would be satisfied based on EPA’s benefit and cost estimates, even apart from our qualitative evaluation.

The permittee also cites to a Department of the Interior (DOI) rulemaking on natural resource damage assessments. The DOI rulemaking presents an entirely different set of circumstances and a different legal framework, and is not binding upon the EPA under CWA § 316(b). Even in that case, DOI proposed a “bright-line standard” of 10:1 in one analytical context, while it noted that in other analytical contexts the role of the proportionality of costs to benefits in decision-making should be “resolved on a case-by-case basis.” 61 FR 20560, 20601 (May 7, 1996).

18. Comment
The permittee stated that “EPA is incorrect in suggesting that the wholly disproportionate test is somehow unimportant to the § 316(b) determination.” The permittee stated that determination of whether the costs are wholly disproportionate is of critical importance in determining what technology will be considered to be BTA.

Response
The permittee misstates EPA’s position. EPA has never suggested that the wholly disproportionate test is “unimportant” to the § 316(b) determination. In fact, EPA has reiterated the importance, and potentially decisive nature, of this economic test throughout various sections of its Determinations Document. See July 22, 2002, Permit Determinations Document, §§ 7.2.5, 7.4, 7.7. EPA notes, however, that under § 316(b), costs are not to be a primary or paramount factor in the § 316(b) decision. See *Id.* The courts have repeatedly expressed the identical view with respect to application of the wholly disproportionate cost test for developing effluent guidelines under the Best Practicable Treatment (BPT) technology standard.

As discussed in the July 22, 2002, Permit Determinations Document, in the absence of any statutory, regulatory, or CWA § 316(b) guidance document indicating exactly how the wholly disproportionate test should be applied, EPA has a substantial range of discretion in applying the test. Looking by way of analogy to case law concerning EPA’s application of a “wholly disproportionate cost” test in setting BPT effluent discharge limitations under CWA § 304(b)(1)(B), the courts have held, among other things, that cost is not to be considered a factor of “primary” or “paramount” importance, that this assessment “is a relatively subsidiary task and need not be precise,” and that an “overall” assessment is sufficient. CWA § 304(b)(1)(B) **expressly** requires some balancing of costs against benefits in setting BPT standards. See 33 U.S.C. § 1314(b)(1)(B). Presumably, therefore, in applying the “wholly disproportionate cost” test under

CWA § 316(b), which does not even mention the consideration of cost, costs should also not be a primary or paramount factor. See July 22, 2002, Permit Determinations Document, § 7.2.5e.

19. Comment

The permittee stated that the dollar values Region 1 assigns to biological losses are "grossly inflated." The permittee stated that EPA's "Benefits Transfer Analysis" follows a "general framework consistent with accepted practice" and its own "Guidelines for Preparing Economic Analyses" (September 2000) but contains "numerous methodological errors and unreasonable or erroneous factual assumptions," which lead to an overstatement of benefits. Specifically, the permittee stated: (a) Region 1 arbitrarily overstated the commercial values of fish using invalid methods; (b) Region 1 overestimated the recreational values of fishing and failed to select scientifically sound studies involving closely comparable circumstances; (c) Region 1 incorrectly calculated forage fish values based on the cost of obtaining them from a hatchery, which "cannot serve as a proxy for the value people actually accord the fish in nature"; (d) Region 1 calculated nonuse values using a "rule-of-thumb" that is highly speculative and cannot be justified; (e) Region 1 erroneously failed to "discount" the value of the expected benefits of closed-cycle cooling to their "present value"—an error that likely resulted in an overstatement of the benefits estimates by 95 percent; and (f) even using Region 1's dollar values, the costs of closed-cycle cooling are 37 times greater than the benefits and hence, costs are "wholly disproportionate" to the benefits.

Response

EPA has discussed its benefits analyses in detail above, as well as in a series of memoranda by our expert consultants, which are incorporated by reference into these responses to comments. EPA also discussed its benefits analyses in detail in §§ 7.6 and 7.7 of EPA's July 22, 2002, Permit Determinations Document. The Agency disagrees that its initial estimates were unreasonable or arbitrary, and we have made improvements to the analyses in response to comments. EPA's estimates do not rely on points criticized by the permittee, such as hatchery costs or use of the 50 percent of recreational value "rule of thumb" for calculating nonuse values, an approach which the Agency agrees is not appropriate to use here. EPA also has added discounting to its evaluations in response to the permittee's comments. In the end, as discussed above, EPA's monetized benefits estimate is not wholly disproportionate to either its cost estimates or the cost estimates of the permittee. In addition, EPA's conclusion that the costs are not wholly disproportionate to the benefits is supported by our non-monetized assessment of the benefits.

20. Comment

The permittee stated that once Region 1 realized that application of conventional economic analyses would indicate the costs of closed-cycle cooling were wholly disproportionate to the benefits, Region 1 invented several new methods of calculation to inflate the benefits of closed-cycle cooling. The permittee stated that none of the five reasons Region 1 gave for undertaking this exercise is legitimate. Specifically, the permittee stated that (a) traditional economic analysis does capture impacts on eggs and larvae; (b) EPA's use of impingement data from 1974–1983 **inflates** its benefits estimate, because 316(b) determinations must be made based on **current impacts**; (c) effects of thermal discharges and other stressors are irrelevant, because § 316(b) does not permit a consideration of cumulative impacts—it is only concerned with the adverse environmental effects of cooling water intake structures; (d) secondary effects were counted and in fact exaggerated in the "benefits transfer" analysis; and (c) EPA's claim that only closed-cycle cooling will allow sufficient recovery of fish populations to allow for commercial fishing is "wholly speculative and completely irrelevant" to this analysis.

Response

The permittee's accusations regarding the Region's motivations are incorrect and unfounded. EPA was motivated to undertake a reasonable assessment of both costs and benefits (monetized and nonmonetized) in the context of applying CWA § 316(b). In doing so, and recognizing the difficulty of the exercise, EPA looked at both costs and benefits from multiple perspectives. The Agency believes its analyses are reasonable and appropriate, and it has explained them in detail above as well as in §§ 7.6 and 7.7 of EPA's July 22, 2002, Permit Determinations Document. EPA also quite properly pointed out limitations of the various analyses and believes its explanations are sound. See, e.g., *Id.* at pp. 7-144 to 7-145.

With respect to the specific points in the above comment, the "traditional economic analysis" did not capture the benefits of a majority of the organisms that would be saved from entrainment and impingement by the permit's cooling water intake improvements. *Id.* Elsewhere in these responses to comments, and in the EPA's July 22, 2002, Permit Determinations Document, the Agency has explained why using the 1974–1983 data is appropriate in this context. The effects of thermal discharges and other stressors are **not** totally irrelevant to this analysis, though EPA did not put monetized values on these considerations. The nature and seriousness of the adverse impacts being perpetrated by the power plant's cooling water intake can be exacerbated by the cumulative effects of these other stressors. It makes no more sense for EPA to view cooling water intake effects in some sort of artificial vacuum than it does for EPA to do so with respect to thermal discharges under CWA § 316(a), an approach which EPA has clearly rejected. See *In the Matter of Public Service Company of New Hampshire (Seabrook Station, Units 1 & 2)*, 10 ERC 1257, 1262 (U.S. EPA, NPDES Permit Application No. NH 0020338, Case No. 76-7, June 17, 1977) ("effect of the discharge must be determined not by considering some hypothetical unstressed environment, but by considering its impact on the environment into which the discharge will be made"). It is fair to take these factors into account in applying the wholly disproportionate cost test. EPA has adjusted its approach to the secondary economic effects in response to comments, as is discussed elsewhere in these materials. Finally, as discussed in more detail above, EPA's monetized benefits estimates do **not** depend on its conclusion that the permit limits it has proposed are likely to help to facilitate the recovery of the fishery, while the limits proposed by the permittee are unlikely to do so. EPA's monetized estimates are simply based on the number of fish that would be preserved as a result of the permit limits. EPA's qualitative consideration of benefits does, however, take this difference into account to an extent, as explained above.

In addition, our conclusion with regard to the recovery of the fishery is not "wholly speculative." EPA explained our reasoning and the facts supporting it in EPA's July 22, 2002, Permit Determinations Document and have discussed this issue in more detail elsewhere in these responses to comments. In addition, EPA notes that the May 2003 draft study by RI DEM fisheries expert Mark Gibson, that was submitted to EPA by the permittee with a July 30, 2003, letter from Ernest Hauser, Senior Vice President, PG&E-NEG, to Linda Murphy and Damien Houlihan of EPA, clearly concludes that the proposed permit intake limits are necessary (along with fishing restrictions) to give the Mount Hope Bay winter flounder population a reasonable chance to recover. This is only a draft study, of course, and it is therefore subject to change. However, the permittee requested that EPA consider it, and the Agency has done so and finds that it clearly supports the Agency's conclusions on this subject. This conclusion was reiterated by Mark Gibson in a letter to EPA on September 24, 2003.

21. Comment

The permittee stated that under CWA § 316(b), Region 1 must evaluate the location, design, construction, and capacity of the cooling water intake structure that reflects BTA for minimizing adverse environmental impact at a cost that is "reasonably related to the benefits." In support of this statement, the permittee cites *In re Public Service Company Of New Hampshire, et al.* (Seabrook Station, Units 1 and 2), 10 ERC 1257, 1261, 1 E.A.D 332, 340 (1977) (holding that § 316(b) does not "require use of technology whose cost is wholly disproportionate to the environmental benefit to be gained"). The permittee further stated that EPA is required to consider the technological feasibility and cost of various available alternatives for reducing adverse impact, and to compare the benefits of these alternatives to their costs.

Response

EPA disagrees with the permittee's characterization of the required economic tests. The Agency has provided a detailed explanation of its view on consideration of costs under section 316(b) in the July 22, 2002, Permit Determinations Document. See July 22, 2002, Permit Determinations Document, § 7.2.5e. The *Seabrook* decision established a much more stringent environmental test than the permittee's asserted "reasonably related to" test, which was in fact rejected in the discussion of section 316(b) in *Seabrook.* 10 ERC at 1261. It appears that the permittee is citing language from the initial decision of the Region 1 Regional Administrator (RA), which was reversed on appeal. The RA had stated that "[d]etermining the degree of minimization required calls for a balancing of costs with the magnitude of the environmental impact to be avoided to achieve a reasonable relationship between the costs of the technology and the magnitude of adverse environmental harm avoided." *Id.* Upon review of Region 1's initial decision, the Administrator held that "[t]here is nothing in Section 316(b) indicating that a cost/benefit analysis should be done" and "insofar as the RA's decision may have implied the requirement of a cost-benefit analysis under Section 316(b), it was incorrect." *Id.* The *Seabrook* decision therefore does not support the permittee's assertion and, in fact, establishes a very different economic test—i.e., that costs should be given "some consideration" in determining the degree of minimization to be required and should not be "wholly disproportionate" to the environmental benefit to be gained. See July 22, 2002, Permit Determinations Document, §§ 7.7.2, 7.7.4.

Section 316(b) mandates that the design, location, construction and capacity of a CWIS reflect the "Best Technology Available" for minimizing adverse environmental impact. See July 22, 2002, Permit Determinations Document, § 7.2.5b. Although CWA § 316(b) does not expressly refer to a "technological feasibility" test, EPA has interpreted the term "available" in section 316(b) to mean that, at a minimum, any technology that might be either directly required or indirectly required as the result of a flow limitation must be technologically and economically practicable. See July 22, 2002, Permit Determinations Document, §§ 7.2.5a, 7.2.5b. EPA believes the NPDES permit's limits are, in fact, based on technological approaches that are technologically and economically practicable. Indeed, no significant arguments were presented by the permittee, or any other commenter, to the contrary. (EPA acknowledges, of course, that the permittee objected to the Draft Permit's limits on many other grounds.)

As stated above, CWA § 316(b) requires that the location, design, construction, and capacity of CWIS's reflect the "Best Technology Available" (BTA) for minimizing adverse environmental impacts. As discussed in EPA's July 22, 2002, Permit Determinations Document, "minimizing adverse environmental impacts" means to reduce them to the smallest possible degree. See *Id.* at § 7.2.5d. In addition, the technology that most effectively minimizes adverse environmental impacts will be considered the "Best Technology Available" for that purpose. *Id.* at § 7.2.5b. Consistent with that, and by analogy to EPA's approach to applying the Best Available Technology (BAT) technology standard for effluent discharge guidelines, EPA explained that it would look to the single best-performing CWISs in terms of minimizing adverse environmental impacts to help determine BTA standards. *Id.* Of course, as is also discussed in EPA's Draft Permit record, EPA conducts a case-by-case analysis to determine whether the particular technology used at another facility is technologically and economically feasible for use at the particular facility being permitted. EPA determined that BTA at BPS would involve retrofitting all four generating units at the plant with mechanical draft wet cooling towers given that (a) other existing fossil fuel-burning plants have undergone technological retrofits from open-cycle to closed-cycle cooling using this technology, and (b) a retrofit to closed-cycle cooling is both technologically feasible and economically practicable at BPS. See discussion in Chapter 7 of the July 22, 2002, Permit Determinations Document.

As discussed above, the best-performing technology for minimizing a CWIS's adverse environmental impacts that is both technologically feasible and economically practicable, and whose costs are not wholly disproportionate to its benefits, constitutes BTA for that facility. Therefore, EPA does not agree that it is legally required to consider the cost and technological feasibility of various available alternatives for reducing adverse impacts to differing degrees. Nevertheless, EPA did just that because it was not entirely clear at the beginning of our evaluation which technological alternative or alternatives would qualify as BTA.

EPA also does not agree that it is required to compare the benefits of all the possible alternatives to their costs to determine what technology constitutes BTA. EPA is also not required to conduct an "incremental" cost-benefit analysis or a "knee of the curve" test in applying the wholly disproportionate cost test under CWA § 316(b). *Id.* at § 7.2.5e. That being said, EPA did provide information regarding estimated costs and benefits for various alternatives in the Draft Permit record. See *Id.* at Tables 7.4-6, 7.4-8, 7.4-9, 7.5-3, 7.5-4, 7.5-6, 7.5-8, 7.5-9, 7.5-11, and 7.6-2.

22. Comment

The permittee stated that Region I's "per-person recreational and nonuse value analysis" of benefits (a) has no basis in economic theory or in EPA's Guidelines, and (b) rests on arbitrary judgments by EPA. The permittee stated that there is no reason to believe individuals in New England or throughout the country would be willing to pay anything for the incremental improvement of a distant water body. Furthermore, the permittee stated that Region 1's use of the per-person method in this case is "particularly unconscionable given that EPA headquarters, citing the same concerns ... expressly rejected this method as a valuation technique for its § 316(b) rule."

Response

EPA disagrees with this comment. EPA explained the theoretical basis for this benefits transfer approach and its foundation in the literature in Chapter 7 of the July 22, 2002, Permit Determinations Document. The Agency has made some improvements to this work in response to comments, and these are discussed above. The Agency disagrees that EPA headquarters has "expressly rejected this method", and it does not believe the materials referenced by the permittee support its claim in this regard. Finally, EPA does not agree that there is no reason to believe individuals in New England or throughout the country would be willing to pay anything for the incremental improvement of a distant waterbody. The Agency provided support for the conclusions it reached in this regard. The Agency also established the basis for the affected population groupings that it used for the "per-person" analysis. The comments it received on the Draft Permit from people and groups representing people from around New England and the Nation support the Agency's thinking. Nevertheless, for the Final Permit analysis, in response to comments, EPA altered it's definition of the affected population to use narrower definitions based on the distance from the affected resource, consistent with an approach from the literature. This is discussed in more detail above, and the results continue to support EPA's conclusions regarding the permit.

23. Comment

The permittee stated that Region 1's use of the "habitat replacement cost" (HRC) method in its valuation of benefits has no support in EPA's "Guidelines for Preparing Economic Analyses" (September 2000) or in fundamental economic theory. The permittee stated that it is "quite apparent" that the costs of restoration activities will not be related to the benefits that they produce. The permittee stated that Region 1 "completely irrationally" used the HRC method as a conservative "lower bound" on the "total value" of the resources, and that Region 1 did not provide any demonstration that restoration costs are likely to be lower than the total use and nonuse values in this case. In addition, the permittee stated, restoration costs have in numerous cases been found to be dramatically higher than the total of use and nonuse values. The permittee stated that where Congress has by statute "made certain categories of individuals or firms responsible for replacing resources they damage," it makes sense to calculate such values, but that § 316(b) does not provide for the recovery of natural resources damages. Instead, the permittee stated, § 316(b) "requires the calculation of valid benefits values, which the HRC method does not and cannot provide." The permittee stated that the best the HRC method can do is to compare the cost of reducing fish losses through changes in BPS's operations with the cost of achieving the same level of reduction through restoration measures, and that this comparison fails to indicate which is the more appropriate method.

Response
The permittee's comments regarding the HRC analysis are discussed in detail in the text above and in memoranda by EPA's expert consultants that are referenced above. That discussion will not be repeated here.

24. Comment
The permittee stated that Region 1 "grossly understates" the "social costs" of the proposed permit limits. The permittee stated that Region 1 acknowledges that the social costs of the retrofit are approximately 75 percent greater than the costs to BPS alone. Since Region 1 far underestimated the costs to BPS, the permittee stated, Region 1's calculation of social costs was based on a "flawed premise." The permittee stated that using a "more reasonable estimate" of the costs to BPS of performing the retrofit, the social cost of the retrofit would be about $390 million in present value terms.

Response
EPA discussed social costs in more detail above. As discussed above, EPA believes it has reasonably and appropriately estimated the social costs. In its comments, the permittee essentially accepts the social cost analytic framework used in the Abt Associates analysis for the Draft Permit, but contests the results of this analysis because it relied on what the permittee feels are underestimates of technology installation and operating costs and other operating impacts. EPA has responded to the comments regarding capital and operating costs elsewhere in this document. EPA recognizes that since social costs will be higher than private costs, the social costs corresponding to the permittee's private costs estimates would also be higher. The Agency did not, however, calculate social cost estimates based on the permittee's private cost estimates. In addition, the permittee does not appear to have provided a social cost analysis of its own based on its private cost estimates. Comments filed for the permittee by its attorneys identify a social cost estimate of "on the order of $390 million in present value terms," see *Comments of Brayton Point Station*, submitted on behalf of BPS by Foley Hoag (October 4, 2002), p. 92, but these comments provide no reference for this figure, and EPA can find no analysis supporting it in any of the comments by the permittee's consultants. In any event, the Agency does not believe such a social cost figure would change the results of the wholly disproportionate cost test. Finally, the permittee also stated that the social costs are approximately 75 percent higher than the private costs. EPA does not agree that this constitutes a rule of thumb applicable in all cases. While the analytical framework for calculating social costs from private costs remains the same, the actual ratio of social to private costs in any given case would depend on the facts of that case.

25. Comment
The permittee stated that Region 1's analysis is "incomplete and misleading" as to who will ultimately pay the costs of retrofitting closed-cycle cooling at BPS. The permittee agreed with Region 1 that electricity rates will rise by a relatively small amount if its permit limits are imposed but stated that Region 1 makes no mention of the total amount of money that electricity users will pay. The permittee stated that based on Region 1's estimates, the increase in electricity rates for users will amount to $7.6 million, and that this number significantly understates the cost because Region 1 ignores the fact that increased generation costs at BPS will affect the price of electricity sold throughout New England. Therefore, the permittee stated, Region 1's alternative estimate, which implies costs of $32.8 million annually, is "more realistic." The permittee stated that because BPS makes up a small share of total generation in New England, nearly all of this increase in electricity costs will benefit other electricity generators. The permittee further stated that a significant portion of BPS's "lost profit" due to the retrofit is money that would otherwise have been paid in taxes to the federal government, estimated by BPS's

consultant to cost the federal treasury $144 million in present value terms. Finally, the permittee stated, most of the $236 million cost of the retrofit will be "paid for" by a reduction in returns to thousands of individuals across the country who hold stock in BPS's parent company.

Response
The permittee's comments concerning EPA's consumer rate effect analysis are addressed above. EPA also reasonably and appropriately discussed the costs of the retrofit and acknowledged that they will principally be borne by the company and its shareholders. While the permittee also complains that increased generation costs at BPS will benefit other generators, this will not be a large effect within the overall regional electricity market. It is also not a concern of EPA. The Agency does not base CWA permit limits on which companies will and which companies will not profit in some way from a legal requirement. The Agency bases such limits on the applicable legal requirements. The permittee further argues that lost profits at BPS will result in a drop of $144 million in present value terms in tax revenues to the Federal treasury. Without accepting that this is necessarily a correct value, even if it is, it is not an important consideration to EPA in developing CWA permit limits. There has never been an indication in the statute, regulations, case law, or Agency legal interpretations that EPA is to apply the CWA with an eye to maximizing federal tax revenues.

26. Comment
The permittee stated that "[t]here is no support for EPA's contention that economic practicability refers solely to whether a facility can comply with the proposed BTA and remain in business." Citing the proposed Phase II 316(b) rule, the permittee stated that EPA's implementation of the economic practicability test "suggests that additional factors are to be considered."

Response
EPA disagrees. As discussed in section 7.2.5a of the July 22, 2002, Permit Determinations Document, the only support for cost considerations in the legislative history of CWA § 316(b) comes from one representative's comments that "best technology available" in § 316(b) should be interpreted to mean "the best technology available commercially at an economically practicable cost." 1972 Legislative History, p. 264. EPA has interpreted this statement in the § 316(b) context to mean that the application of BTA "should not impose an impracticable and unbearable economic burden" on plant operations; that is, the cost of proposed BTA actions should not be financially impossible for a plant to implement and remain in business. See July 22, 2002, Permit Determinations Document, § 7.2.5a.

As discussed elsewhere in this document, the permittee's reliance on the discussion of costs in the Proposed Phase II 316(b) Rule is misplaced. The preamble to the proposed rule states that "[b]ecause the Agency is inviting comment on a broad range of alternatives for potential promulgation, today's proposal is not intended as guidance for determining the best technology available to minimize the adverse environmental impact of cooling water intake structures at potentially regulated Phase II existing facilities." 67 Fed. Reg. at 17124. Until EPA promulgates final regulations based on the proposal, § 316(b) determinations for existing facilities are to be made "on a case-by-case basis applying best professional judgment," which may be more or less stringent than the proposal. *Id.* That being said, EPA does not see anything in the discussion the permittee references from the preamble of the Phase II Rule, 67 FR 17123, 17144-145 (April 9, 2003), that is fundamentally inconsistent with the assessment the Agency has undertaken. For example, EPA also evaluated regional energy effects and consumer ratepayer effects, as well as the costs to the permittee and its ability to afford them.

27. Comment
The permittee stated that the "line-by-line" analysis is invalid and thus does not support EPA's conclusions regarding the "conservative" nature of the § 316(b) estimate. Moreover, the permittee stated, EPA acknowledges the § 316(b) methodology makes no allowance for site-specific conditions. The

permittee noted that a site-specific analysis was performed by Stone & Webster and confirmed by Bechtel, which shows costs significantly higher than the § 316(b)-based estimate.

Response
EPA used two methods of cost estimation. It undertook a site-specific analysis which we have referred to as the "line-by-line analysis" because it is based on the permittee's line-item costing spreadsheets as a major input to the analysis. We also conducted a more generic analysis using the so-called "CWA § 316(b) method." EPA has addressed the permittee's comments on EPA's independent cost analyses in detail elsewhere in these responses to comments. EPA concludes that both our analyses were reasonable and valid. See SAIC's report, "Statistical Analysis of USGen Costs versus SAIC Costs" (Appendix Q). EPA also notes that the § 316(b) analysis was adjusted in various ways to provide a more site-specific value (e.g., adjustment for use of salt water). Finally, EPA notes that its two separate, independent analyses came up with relatively similar estimates, and EPA then used the **higher** of the two in its further detailed financial assessment.

EPA disagrees that Bechtel "confirmed" Stone and Webster's analysis. Bechtel did not produce any independent costs for retrofitting Brayton Point Station. In the executive summary of Bechtel's report, Bechtel concludes merely that "... the S&W cost estimates were performed using tools, methods, and assumptions common in the industry and are within the range of cost estimates reasonably anticipated for this type of retrofit work."

28. Comment
The permittee also stated that SAIC presented no information sufficient to support its cost estimate for multimode operation. The permittee said it "agreed that [sic] the cost to install conventional plume abatement technology would be prohibitively expensive."

Response
EPA responds elsewhere to the comments regarding the basis for our cost estimate for equipping the cooling towers to operate in a multi-mode configuration. In addition, EPA did **not** state that the cost of conventional plume abatement technology would be prohibitively expensive. To the contrary, for the Draft Permit EPA looked at the cost of this technology and indicated that it would be more expensive, but affordable. The Agency questioned, however, whether it would be needed. See EPA's July 22, 2002, Permit Determinations Document, pp. 7-33–34, 7-49–51, 7-81, and 7-169. In response to comments, for the Final Permit, EPA has looked in more detail at cooling towers with plume abatement capability. Again, EPA concludes that the costs for this type of cooling towers are higher but, as discussed in more detail elsewhere in these responses to comments, they are affordable and are not wholly disproportionate to the benefits.

30. Comment
The permittee presented conflicting comments concerning the auxiliary power "penalty" for cooling towers. In one place, it agreed that EPA should have used BPS's estimate, but in another place it complained that EPA did not use its own consultant's higher estimate in order to be conservative.

Response
As discussed elsewhere in these responses to comments in more detail, for the Final Permit EPA decided to use its consultant's higher, but reasonable, auxiliary power estimate to be consistent with our conservative approach to the analysis.

31. Comment
The permittee stated that SAIC's conclusion that BPS overestimated the efficiency losses associated with cooling towers is based on "generic information not applicable to BPS."

Response
EPA has concluded that its estimate of efficiency losses is reasonable and appropriate and has addressed the permittee's comments regarding the efficiency "penalty" in detail elsewhere in these responses to comments.

32. Comment
The permittee stated that in preparing the Draft Permit, EPA relied on two forms of economic benefits analysis used in the § 316(b) Phase II rulemaking without meaningfully addressing the numerous critical comments, including comments from BPS, filed in the rulemaking process regarding these methods. The permittee stated that this failure to adequately respond to comments was "inconsistent with the requirements of reasoned decisionmaking" (citing *Chemical Manufacturers Assoc.* v. *EPA*, 28 F.3d 1259, 1265-66 [D.C. Cir., 1994]).

Response
In developing an individual draft permit under the CWA, EPA is obligated to respond to significant, timely comments on the draft permit. The Agency has done so in this document, including detailed responses to comments concerning the "benefits transfer" and "HRC" analyses from the Draft Permit as well as numerous other matters.

EPA is not required to respond to comments earlier provided to EPA Headquarters about a proposed rulemaking. This is especially so when, as discussed above, EPA has been clear that Regions preparing case-by-case individual permits under existing practice are not to use the draft regulations as guidance to direct their permitting. Moreover, it is not even clear what comments or which methods the permittee is referring to; the permittee has only provided a general reference to its comments in the rulemaking without pointing to specific comments. See *NRDC* v. *EPA*, 863 F.2d 1420, fn. 7 (9th Cir., 1988) (upholding EPA's decision not to consider comments pertaining to national rulemaking because "requiring each EPA Region to consider all the comments relating to the national rulemaking in each BPJ permit would impose an unreasonable burden on the agency"); *Mount Diablo Hosp.* v. *Shalala*, 3 F.3d 1226 (9th Cir. 1993) ("there is no obligation to make references in the agency explanation to all the specific issues raised in comments. The agency's explanation must simply enable a reviewing court to see what major issues of policy were ventilated by the informal proceedings and why the agency reacted to them the way it did"). That being said, EPA Region 1's analysis for the Draft Permit was not identical to that conducted by EPA Headquarters for the proposed rulemaking. Therefore, the permittee's comments to Headquarters do not clearly apply to the Region's work on the permit. For example, EPA Region 1 did not use the HRC evaluation to provide an estimate of the actual value of the resources damaged by the BPS cooling water intake structure, whereas Headquarters did for its proposed rule. Indeed, the Region's approach was likely more consistent with the gist of some of the comments that the permittee provided to Headquarters.

In addition, the case cited by the permittee is distinguishable on its facts. In *Chemical Manufacturers Assoc.* v. *EPA*, 28 F.3d 1259 (D.C. Cir., 1994), the petitioners presented specific objections to the EPA's use of a particular air-dispersion model to predict the ambient air of a pollutant called MDI. 28 F.3d at 1265–66. The court stated that EPA had "responded in a high-handed and conclusory manner" to these comments. *Id.* For example, the court observed, EPA "accepted [the petitioner's] point that MDI is a solid at the ambient temperature (20 ºC) at which the model assumes that the generic pollutant is a gas, yet it dismissed [the petitioner's] objection that a solid cannot act as a gas with the facile assertion that 'it is likely that MDI is emitted at temperatures higher than ambient and so would disperse much like any other pollutant,' that is, as a gas." *Id.* at 1266. The court noted that "in fact, the record shows that MDI is still a solid at 37 ºC." *Id.* Stating that EPA had made a "speculative factual assertion" that bespoke a "let them eat cake" attitude, the court vacated EPA's decision designating MDI as a high-risk pollutant. *Id.* Contrary to the facts in *Chemical Manufacturers*, for this permit, EPA has carefully considered the permittee's comments and responded reasonably and adequately to them. Furthermore, EPA has always been willing to meet with the permittee and consider its views and data.

33. Comment
The permittee stated that "[v]irtually every one of EPA's supposed 'conclusions' is ultimately no more than conclusory assertions." Specifically, the permittee stated, EPA (a) prejudged the outcome by assuming that "only" closed-cycle cooling will allow recovery of fish in Mount Hope Bay; (b) reiterated "speculative conclusions" regarding the unimportance of fogging, icing and noise impacts; and (c) stated that its economic analysis is not "primary" and need not be "precise."

Response
EPA disagrees with this comment. The Agency did not "prejudge" its permit determination. EPA has explained in detail the bases for its conclusions related to the issues noted above in the July 22, 2002, Permit Determinations Document and in this document.

Biological Impacts

34. Comment
The permittee stated it submitted three new papers presenting biological analyses on July 3, 2002, and that EPA's refusal to consider these new reports, prior to issuance of the Draft Permit is "inconsistent with the requirements of reasoned decision making" (citing *Chemical Manufacturers Assoc.* v. *EPA*, 28 F.3d 1259, 1265–66 (D.C. Cir., 1994)). The permittee further stated that "[t]he clear implication is that EPA had made up its mind and had determined that it would not hear evidence to the contrary."

Response
EPA disagrees with this comment and believes the criticism it presents is patently unfair. As explained in § 7.5 of the July 22, 2002, Permit Determinations Document, EPA was not able to consider the three new studies prior to issuance of the Draft Permit because of their extremely late submittal. Although the permittee's permit application was due in January 1998, and it finally submitted its completed CWA §§ 316(a) and (b) Demonstration Documents in December 2001, it did not submit these three new studies until July 3, 2002. EPA was just about to issue the Draft NPDES permit and did so on July 22, 2002. While EPA had delayed reissuance of this overdue permit—the permit expired in July 1998—to give careful consideration to the permittee's Demonstration Documents, among other things, the Agency could not perpetually delay the permit in response to repeated late submissions from the permittee. In any event, EPA explained in the July 22, 2002, Permit Determinations Document (at pp. 1–3, 6–2) that the Agency would give the permittee's new analyses careful evaluation during the public comment period, along with other public comments and/or new information that might be submitted during the comment period. EPA has made good on this commitment. The permittee's submissions have been considered and responded to in detail in this document.

In addition, as discussed in the response above, *Chemical Manufacturers Assoc.* v. *EPA* is distinguishable from the present case.

35. Comment
The permittee stated that EPA's implication that "unusual impingement events" at BPS are a significant adverse impact of the station is "unfounded." The permittee also stated that EPA's suggestion that entire schools of fish may be eliminated in these events is "completely speculative."

Response
BPS is required to monitor impingement rates on an ongoing basis, and it is acknowledged that some low level of fish mortality will occur as part of the routine operation of the station. However, when 25 or greater fish per hour are impinged, this is deemed an "unusual impingement event" by the terms of the

permit and triggers additional data collection requirements for the permittee. These discrete events may involve large numbers of one or two species, or lower numbers of a wide spectrum of species, being impinged by the plant's intakes. In Chapter 7 of its July 22, 2002, Permit Determinations Document, EPA describes the magnitude and frequency of some of the recent unusual impingement events.

Without commenting on each individual event over the history of the plant's operation, EPA views these events cumulatively, and many of them individually, as significant adverse impacts. Any time tens of thousands of fish are killed by a facility, even if they are not commercially important, EPA views this as a significant adverse impact. Even the forage species that tend to be impinged in very high numbers have important ecological functions, as they provide a link from the planktonic food chain to the higher fish and bird species. EPA has long maintained that impingement of fish is an adverse impact under CWA § 316(b), and our view here is consistent with this longstanding position. Moreover, EPA is not the only entity concerned about impingement losses of forage species to power plants. The Atlantic States Marine Fisheries Commission has initiated a study examining the impact of power plant entrainment and impingement losses to Atlantic menhaden populations along the mid-Atlantic coast. Finally, the adverse impacts from impingement must also be considered together with other adverse impacts from the intake, such as the entrainment of huge numbers of organisms from the estuary.

Over the last year, EPA has required BPS to provide more detailed information regarding unusual impingement events in hopes of gaining an understanding of what initiates them and what may cause them to end. Historically, BPS has only reported the number and species of fish lost, but no effort was made to attempt to understand why these events occurred. In response to queries from EPA, the permittee and its consultants suggested that wind direction, tidal state, and/or the presence of coal delivery ships may all play a role in triggering these events. Thus, EPA requested specific information on plant flow, water temperature, wind speed and direction, tidal information, and presence/absence of coal delivery vessels corresponding with the time of any future events. Since this request, several additional unusual impingement events have occurred, and BPS has provided the additional information, but to date there is no strong correlation between any of the factors evaluated and the magnitude and duration of any particular event.

These events typically continue for several days at a time and can consist of tens of thousands of individual fish. EPA believes that what generally happens with the schooling forage fish is that they tend to follow the shallow water along the shoreline, and when they reach BPS, the intake structure acts as a contiguous part of the shoreline. Thus, fish swim by it, but on the far side of the intake the shoreline becomes a wall. The fish could follow this wall, but it leads them out over the dredged berthing area for the coal vessels, which represents deep water. These fish likely stay in shallow water to avoid predation, thus they may tend to become trapped in the inlet in front of the intake. As a result, they become susceptible to large impingement events. Some of the recent large events have involved on the order of 40,000–70,000 fish. It is EPA's judgement that this may represent essentially the effective elimination of a school of fish. This is further supported by the fact that these events may run for several days to over a week, which is more than the time the fish would have needed to have left the area, and there is no clear reason as to why the events eventually end other than that the supply of fish in front of the intake may have been exhausted. EPA note's the permittee has not provided any compelling alternative explanation.

36. Comment

The permittee disagreed with EPA's statement that Mount Hope Bay constitutes only 0.05 percent of the total surface area of Rhode Island state waters.

Response

The commentor is correct that Mount Hope Bay constitutes 5 percent (not 0.05 percent) of the surface area of Rhode Island state waters.

37. Comment
The permittee stated that EPA is incorrect to dismiss density dependence in its analysis of entrainment effects, and that the concept of density dependence is firmly established in the scientific literature.

Response
EPA does not reject the concept of density dependence out of hand. Density dependent effects may occur when high levels of abundance of one species lead to increased mortality rates for the individuals of that species. This may occur due to competition for resources, be it food or space, or as a result of greater susceptibility to predation. Thus, theoretically, as abundance numbers decrease, mortality rates for the survivors will also decrease.

The permittee is asking for credit for reducing density dependence effects in Mount Hope Bay plankton communities by virtue of the power plant's killing large quantities of plankton. Thus, the permittee argues that it is actually a beneficial effect for the power plant's cooling water intake to kill billions of fish eggs and larvae. EPA's rationale for not considering density dependence effects in this manner in our assessment of the adverse impacts of cooling water intake operation is clearly articulated in Chapter 7 of EPA's July 22, 2002, Permit Determinations Document (page 7-112). The permittee has simply provided no compelling evidence that density dependence effects are occurring in Mount Hope Bay and plainly has no basis for assessing the relative importance of these effects even if they were occurring. While the permittee cites a report by Collie and Delong (2002) in support of their comment, this report provides no compelling evidence of density dependence effects. EPA sees no solid evidence of these effects occurring in Mount Hope Bay, and as such believes it would be inappropriate to change our analyses.

38. Comment
The permittee disagreed with EPA's statement that loss of larvae could "reduce the resilience of population, making it more susceptible to a decline and prevent or inhibit the recovery of a particular population that is depressed ..." The permittee stated that this statement is "entirely speculative" and unsupported. The permittee further stated that there is no support for EPA's view that making a population more susceptible to a decline or inhibiting its recovery is a valid consideration under § 316(b).

Response
Members of the BPS TAC have long voiced concern that entrainment of eggs and larvae may be reducing the resilience (or "compensatory reserve") of the winter flounder population in Mount Hope Bay. The theory is that fish populations will produce large numbers of eggs in anticipation of years with the most favorable environmental conditions. In years with favorable conditions, survival and subsequent recruitment to the adult fishery increases. These pulses of high recruitment can sustain a population at a high or adequate abundance level for several years past the recruitment event, which may be important for helping the population weather years with adverse environmental conditions. In other words, the good years provide a "reserve" to help compensate for the bad ones. The "compensatory reserve" theory is a well-established scientific theory and it is proper to consider it in this context. See, e.g., 66 FR 65294 (Dec. 18, 2001) (Preamble to Final Phase I CWA § 316(b) Regulations) (discussion of compensatory reserve issue).

TAC members had voiced concern that large entrainment losses may prevent these pulses of recruitment from occurring and negatively effect the resilience of the winter flounder population. EPA mentioned this concern in our § 316(b) analysis and believes it is a valid consideration that tends to support our decision. EPA recognizes, however, that it does not have definitive information on this issue, and it was not a key basis of EPA's decision.

39. Comment
The permittee stated that it does not understand how EPA estimated entrainment rates to be 14 percent greater under current operations than during 1974–1983. The permittee stated that, in fact, entrainment rates are likely to be lower for many species because the abundances are lower.

Response
The explanation of our entrainment rates is laid out clearly in our Determinations Document in Chapter 7. Briefly, these estimates are a function of the available entrainment data, estimates of current operation of Unit 4, and differences in entrainment rates at Unit 4 compared to Units 1, 2, and 3. BPS has not collected comprehensive entrainment samples since 1985. Thus, no recent estimates of entrainment of larval fish and eggs, other than winter flounder, exists for the station. EPA used the historical entrainment rates, the only information available, and modified these rates for current plant flow and technologies. There has yet to be established a clear relationship between adult abundance in the bay and entrainment rates for individual species, thus EPA did not reduce our estimates of entrainment rates based on observed lower adult abundance in the bay.

40. Comment
The permittee stated that EPA's conclusion that Mount Hope Bay is the appropriate reference point for entrainment and impingement losses of species other than winter flounder that have no natal fidelity to Mount Hope Bay is "arbitrary and incorrect." The permittee stated that "[a]s even EPA admits, there is an exchange of some quantity of fish larvae in Narragansett Bay." In addition, the permittee asserted, many of the species that may be affected by the plant in Mount Hope Bay are part of much larger coastal populations. The permittee stated that, according to EPA's existing precedent, where the relevant population is large, the existence of even significant levels of impact will be acceptable.

Response
Under EPA's current mode of applying CWA § 316(b), each permit's limits are determined on a case-by-case basis in light of the facts of that case. EPA has never declared that even significant levels of adverse impact will be acceptable where the relevant population affected is large. Again, as discussed in detail in Chapter 7 of EPA's July 22, 2002, Permit Determinations Document and elsewhere in this document, EPA considers the intake's adverse impacts from a variety of perspectives to assess their magnitude and these impacts must be minimized in accordance with the BTA, except to the extent that the costs of the BTA would be wholly disproportionate to its benefits.

EPA maintains that Mount Hope Bay is the appropriate frame of reference for entrainment and impingement losses for a number of reasons. First, winter flounder is not the only relevant species that has a high degree of fidelity to natal spawning grounds. Weakfish and anadromous fish species do as well. Second, EPA is interested in quantifying impacts of its permit decisions to particular water bodies as well as to fish populations at large. Mount Hope Bay, with its constricted connections to Narragansett Bay is obviously the water body at issue. It is the source of BPS's cooling water, and it receives BPS's thermal discharge.

Under CWA § 316(b), EPA must ensure that the cooling water intake reflects the BTA for minimizing adverse environmental impacts. Under applicable water quality standards, designated uses and criteria applicable to a particular water body must be satisfied. Under § 316(a), EPA is required to assure the protection and propagation of the balanced indigenous community in **the** receiving water. In applying these standards, EPA believes it is appropriate to consider impacts to the Mount Hope Bay populations of these organisms. This is clearly so under CWA § 316(a) and water quality standards, including consideration of the cumulative effects of intake entrainment and impingement and discharges.

It is also the case under CWA § 316(b), where taking a large percentage or number of a species from a particular water body is an adverse impact. EPA recognizes that the significance of that impact **may** be less if that species is part of a much larger breeding population. However, EPA does not think the argument should be carried too far. First, these effects could disrupt the local balanced, indigenous community. Second, the fact that a species also exists and breeds elsewhere should not be used to justify extirpation of local populations of a species. Indeed, if this approach was taken across the board, the cumulative effects could be devastating to the species. For example, EPA does not believe it would be wise public policy to allow for the local extirpation in Mount Hope Bay of a wide-ranging species such as, for example, Atlantic menhaden, even though that impact may not significantly harm the East Coast interbreeding population of Atlantic menhaden. Moreover, as stated above, these losses may be important for normal ecosystem dynamics in Mount Hope Bay.

The permittee cites to the *Seabrook* case in support of its position, but the situation in Mount Hope Bay is clearly distinguishable from that case. In *Seabrook*, a key factor was that the proposed intake location had been moved from the estuary to a more distant ocean location, at significant expense to the company. See *In the Matter of Public Service Company of New Hampshire (Seabrook Station, Units 1 and 2)*, 1978 WL 2140 (p. 25), 1 E.A.D. 455 (NPDES Permit Application No. NH 0020338, Case No. 76-7) (August 4, 1978) (Decision of the Administrator on remand). This was done in order to reduce adverse environmental impacts. Having chosen that new ocean location, EPA then evaluated the impacts with respect to the relevant ocean populations of organisms. In this regard, the *Seabrook* decision was based on its unique facts. These facts obviously differ from the case of BPS, with its cooling water intake structure in the Mount Hope Bay/Narragansett Bay estuary. *Id.*

41. Comment
The permittee stated that EPA's conclusion, based on Mark Gibson's report, that Mount Hope Bay has experienced more severe changes in fish abundance than in Narragansett Bay is incorrect. The permittee further stated that the Wilcox trawl data "convincingly demonstrates that **present** abundances of fish in Mount Hope Bay and Narragansett Bay are essentially identical."

Response
The permittee has relied on an analysis by its consultant, Joseph DeAlteris, to support its comment that declines in fish abundance in Mount Hope Bay and Narragansett Bay are "essentially identical." EPA has reviewed and considered this analysis and the permittee's comments based on it. EPA's critique of this analysis is presented elsewhere in these responses to comments. The Agency still maintains that the decline in fish abundance in Mount Hope Bay is statistically different than that of Narragansett Bay. EPA has fully explained the data upon which it bases this conclusion. The permittee submits results from the Wilcox Trawl survey, but this effort was only initiated relatively recently (in 1997). This survey only samples a small portion of Narragansett Bay, and it began well after the collapse of fish stocks occurred in Mount Hope Bay. Due to the short duration of this survey and the limited number of samples, the statistical power of this survey is low. Thus, it is not surprising that it did not detect a difference between Mount Hope Bay and Narragansett Bay. It should be noted that another of the permittee's consultants, Raymond Hilborn, declined to use the results of this survey in a quantitative fashion due to its limited duration. EPA believes the analysis from the 1996 Gibson report demonstrates that Mount Hope Bay has exhibited an unique decline in fish abundance. Even PG&E-NEG's consultant, Joseph DeAlteris, has admitted that the facility is having a measurable impact on the upper third of Mount Hope Bay. Based on the limitations of the Wilcox Trawl as discussed above, EPA believes that the conclusions from the Gibson report are still valid.

Gibson, MR. 1996. Comparison of trends in the finfish assemblage of Mt. Hope Bay and Narragansett Bay in relation to operations at the New England Power Brayton Point Station. RI Division Fish and Wildlife Research Reference Document 95/1.Revised August, 1996.

42. Comment
The permittee stated that recorded catch rates do not form an adequate basis for concluding that the population numbers for windowpane and tautog are as low as winter flounder.

Response
EPA's document states that the low catch rates suggest that abundance for these other species may be as low as winter flounder. The Agency believes that making this suggestion is reasonable and appropriate based on the available data. EPA does not, however, draw any definitive conclusions on this point, and it does not then carry forward the analysis to calculate a percentage of the population lost to entrainment and impingement based on this information.

43. Comment
The permittee stated that EPA makes no attempt to quantify or explain what it means by "total ecosystem production foregone," and that there is no precedent for including this concept in a § 316(b) analysis.

Response
A Production Foregone Analysis simply estimates the amount of biomass that would have been produced by organisms that are lost to entrainment or impingement. Typically, these calculations are done exclusively for nekton or fish. Fish are only one component of any aquatic ecosystem. Phytoplankton and invertebrates comprise essential pieces of the food chain, and these species are also susceptible to entrainment and impingement. Entrainment and impingement losses of organisms other than fish are rarely quantified due to the difficulty and cost of the identification work and the sheer numbers of organisms that would need to be enumerated. BPS has never quantified entrainment and impingement losses of organisms other than fish. The concept of total ecosystem production foregone simply acknowledges that these facilities entrain and impinge more than just fish. It is a well established ecological principle that creatures at lower levels of the food chain exist in greater abundance than creatures at the upper levels of food chain. The data does not exist to quantify the losses of planktonic life stages of crustaceans, shellfish, worms, other invertebrates, and phytoplankton, but it is unquestionably larger than the nekton production foregone, based on the sheer abundance of these organisms in the marine environment. EPA believes it is appropriate for the Agency to try to assess or consider the impact of plant operations to all of the various marine communities found in Mount Hope Bay. Though EPA cannot quantify the entrainment and impingement losses to these communities, EPA's analysis acknowledges that it is occurring.

44. Comment
On July 30, 2003, PG&E-NEG submitted additional information for EPA's consideration. This submission included a nine page cover letter, a report prepared by LMS entitled "Mark R. Gibson's May 2003 Assessment of BPS's Impact on Mount Hope Bay Winter Flounder: A Comparison to Prior Assessments," a variety of material on economics and a Draft May, 2003 report by Mark Gibson entitled "An Assessment of the Impacts of Fishing and Brayton Point Power Station on Local Stocks of Winter Flounder Using a Nested, Biomass Dynamics Model." The major point related to the biological analysis of this submission is that the permittee claims that Gibson's report shows that EPA overestimated the effect of the plant on the winter flounder population in Mount Hope Bay. Specifically, they point to this report as evidence that Gibson believes that the population of winter flounder in Mount Hope Bay is currently 423,000 individuals.

Response
EPA has reviewed the permittee's submission, including the Draft report by Mark Gibson. The intent of Gibson's analysis is to examine the cumulative impact of fishing and BPS on winter flounder in Narragansett and Mount Hope Bays. The focus and most important result of this analysis is the long-term abundance trend estimate, rather than a specific population estimate. The report asks whether specific combinations of fishing management and reduction in BPS flow are likely to result in a winter flounder

population in Mount Hope Bay that will recover within a reasonable time frame (10 years). Gibson does not specifically provide an estimate of the Mount Hope Bay winter flounder population in numbers of fish, as that is not the intent of this analysis. Based on this analysis, Gibson concludes that dramatic reductions in plant operations, consistent with EPA's draft permit conditions, are needed in conjunction with further reductions in fishing mortality to ensure a recovery of the winter flounder population in Mount Hope Bay. Reducing fishing mortality alone will not result in a recovery of winter flounder in Mount Hope Bay within a reasonable time frame, nor will reducing only mortality from BPS be sufficient to restore winter flounder in Mount Hope Bay. (This is consistent with EPA's conclusions and, as discussed elsewhere, fishing restrictions are being implemented by Massachusetts, Rhode Island, and the Federal government.)

In its submission to EPA, the permittee derived a population estimate for winter flounder in Mount Hope Bay from Mark Gibson's analysis. The Gibson analysis is a biomass model, and one can convert biomass to numbers of individual fish by assuming a specific weight per adult fish. The permittee, therefore, converts Gibson's biomass numbers and derives an estimate of 423,000 adult winter flounder in Mount Hope Bay. EPA has consistently maintained that any model-generated results must reasonably match actual data collected in the field. In this particular case, any model estimate of flounder abundance in Mount Hope Bay must produce values that can be reasonably correlated with the MRI trawl survey results. In its earlier comments on the Draft Permit, the permittee's consultant Raymond Hilborn, derived a winter flounder population estimate of 300,000 for Mount Hope Bay. EPA responded to this comment with an analysis examining winter flounder distribution within Mount Hope Bay and winter flounder catch rates from the MRI and RI DEM trawl surveys. These calculations showed that a baywide population estimate of 300,000 produced winter flounder densities on the bottom that were dramatically inconsistent with winter flounder catch rates from the trawls. This analysis showed that catch rates were an order of magnitude or greater too low for the winter flounder population in Mount Hope Bay to truly be 300,000. A population estimate of 423,000 would only produce higher densities of winter flounder on the bottom and a greater discrepancy with the trawl survey results. EPA has shared this analysis with Mark Gibson, who acknowledges a "scaling problem" exists in his new draft analysis. Of course, the "scaling problem" does not affect long-term abundance patterns (i.e., the model still shows a collapse in 1984-1985).

Mark Gibson has discussed the permittee's characterization of his work with EPA and has submitted to us a September 24, 2003, letter reiterating his major conclusion that EPA's permit limits are appropriate, and refuting PG&E-NEG's characterization of his work. Furthermore, Gibson states that:

> . . . direct calculation of stock size from company and RIDEM surveys using area swept or ratio methods indicate that the population of winter flounder in Mt. Hope Bay is quite small. These low abundance estimates, and the implied high plant impact considering company equivalent adult calculations, remain viable given the assumptions used.

EPA's believes its Mount Hope Bay winter flounder population estimate of 7,500 fish remains reasonable, and Gibson's new work does not change our conclusion in this regard.

Moreover, having reviewed the permittee's submission and Gibson's work, as well as having discussed the matter with Mr. Gibson, EPA finds no compelling reason to change the conditions in the Draft Permit based on these materials. First, Gibson's report was only a draft report, which means it is a work in progress, and its content and analysis is subject to change. Second, the final conclusion of this draft report suggests that EPA's Draft Permit conditions are appropriate. Third, the only piece of the analysis that is arguably inconsistent with EPA's work to date is the derived population estimate of winter flounder for Mount Hope Bay. Yet, EPA, in responding to other comments from the permittee, shows that winter flounder population estimates for Mount Hope Bay in the hundreds of thousands of fish are very unlikely. Finally, Mr. Gibson has reaffirmed his support for EPA's permit conditions based on the abundance trend analysis and, in effect, notes that he believes the permittee's winter flounder population estimate based on the draft paper is unsound.

Response # IV.45	**Document #**: 1132, 1148

Comment
EPA received two comments suggesting that the proposed flow limits for the Draft Permit are not sufficiently stringent and the impacts associated with 122 hours/year of once-through cooling are not estimated.

Response
EPA examined the environmental impacts associated with various cooling water intake-related technologies. The Agency determined that a reduction in flow was the best way to reduce impacts from entrainment and impingement. Obviously, from a biological standpoint, an alternative that required no water withdrawal at all would eliminate impingement and entrainment losses completely. However, EPA felt that the approximately 96 percent intake flow reduction required by the new permit limits would adequately minimize adverse environmental impacts from the intake. These limits would achieve a corresponding 96 percent reduction in entrainment and impingement of marine organisms by the intake. In addition, EPA was unable to determine based on present information that a greater flow reduction based on a plant cooling system conversion to dry cooling was feasible. EPA then decided to allow the additional 122 hours of once-through cooling operation – based on flows consistent with the permit's § 316(a)-based thermal discharge limits – because we determined that the additional flow would not likely involve significant impacts in light of the large reductions already required. The Rhode Island DEM and others have expressed concern, however, about the possible effects of this once-through cooling flow during sensitive biological periods. In response to these comments EPA has adopted an additional limitation in the permit which will prohibit the once-through cooling operations between February and May to protect winter flounder spawning. We believe this restriction is a reasonable step to further minimize adverse environmental impacts from BPS's cooling water withdrawals. It is not possible to precisely quantify the impact of the 122 hours of once-through cooling because it will be dependent on ichthyoplankton concentrations in the bay at the time that these bypasses take place. Ichthyoplankton concentrations can be highly variable. However, EPA believes that the provision discussed above will ensure that the impact from the additional bypass operation will be adequately minimized and that it will represent a minor incremental impact on the Mount Hope Bay ecosystem in light of the large reductions in adverse impacts that the permit requires.

Response # IV.46	**Document #**: 1159

Comment
One commenter noted that damage provisions are included in the permit for fish kills associated with discharge-related events, but there is no similar provision for mortalities associated with impingement events. The commenter felt that there should be an equivalent provision for impingement-related mortality.

Response
EPA has decided to remove any fish kill damages provisions from the permit for the following reasons: 1) the provision is taken directly from Massachusetts General Law Ch.130 § 23 (2003) and it applies regardless of whether it is spelled out in the permit; 2) it is a matter of state law and is not federally enforceable; and 3) removing the condition makes the permit more concise. The damages provisions included in the Draft Permit were simply repeated from past BPS discharge permits. These provisions were originally placed in the permit in response to two large fish kill events which, EPA concluded, resulted from a combination of elevated temperature and chlorine discharges. While the Massachusetts law

addresses certain types of fish kills, it does not address impingement-related mortality. Thus, the permit's damages provisions never addressed impingement fish kills.

Response # IV.47	**Document #**: 1133

Comment
EPA received one comment stating that PG&E-NEG's proposed enhanced multi-mode system would result in the loss of large percentages of the resident winter flounder, windowpane, tautog, and hogchoker populations through entrainment and impingement. The ecosystem production forgone would greatly exceed 54 million pounds per year and would exceed the allowable total catch for any sector of the fishing industry. Unlike fishing, the take of these fish provides no benefit to humans or the ecosystem.

Response
Although the proposed enhanced multi-mode system would represent a reduction in flow, it would still result in an annual average daily flow of 650 MGD (the permittee proposes a daily maximum flow limit of 1298.5 MGD, with seasonal monthly average flow limits of 600 MGD for October - May and 750 MGD for June - September). As a result, large quantities of fish eggs, larvae, and other planktonic life would continue to be entrained by the station. Small fish and invertebrates would continue to be impinged in large numbers. The entrainment and impingement losses are converted to adult equivalents by applying various natural mortality rates for each life stage until one reaches the age 3 adult stage. Natural mortality rates are taken from the scientific literature. Once converted to age 3 adults, these losses can be compared to similar aged fish in the bay for a comparison. For winter flounder, EPA estimates that the proposed enhanced multi-mode would result in a take of 70 percent of the adult winter flounder population in the bay. In addition, EPA estimated that the loss of non-commercial forage fish would be more than 54 million pounds per year. EPA agrees with the commenter that the loss of these fish does not provide any direct benefit to humans.

Response # IV.48	**Document #**: 1133

Comment
EPA received one comment stating that impacts on species abundance and diversity are underestimated because data collection began several years after the plant was operational.

Response
It is true that quantitative fish population data do not exist for Mount Hope Bay prior to the construction and operation of BPS. Limited data collected in 1970 by the Massachusetts Division of Marine Fisheries show winter flounder to be the most abundant species taken in their trawl survey. Windowpane was the third most abundant species in this survey. Currently, winter flounder and windowpane rank near the bottom for fish abundance.

BPS has been operating since the late 1960s, which predates the Clean Water Act (CWA) and many other important pieces of environmental legislation. The owners of BPS were not legally required to collect data on fish populations in Mount Hope Bay until 1972. Thus, EPA does not have a precise quantitative sense of the pre-BPS biological community in Mount Hope Bay. However, the data that exist from the early 1970s,qualitatively show a community with abundant winter flounder and windowpane. Anecdotal information also suggests a thriving fishery in the past.

Response # IV.49	**Document #**: 1161

Comment
One commenter addressed a report submitted to EPA by PG&E-NEG from Ray Hilborn. That commenter felt that Hilborn's estimate of winter flounder population size in Mount Hope Bay is unrealistically large based on existing trawl survey data.

Response
EPA has responded to this point elsewhere in this document when discussing the size of the fish population in Mount Hope Bay. Please refer to responses regarding § 316(b) for this discussion.

Response # IV.50	**Document #**: 1161

Comment
RI DEM submitted a series of very detailed technical comments regarding PG&E-NEG's permit renewal application of November 2001 and the additional submissions from Joseph DeAlteris and Ray Hilborn on behalf of PG&E-NEG. These comments covered a wide range of issues, but were primarily focused on specific biological analyses. The major issues covered included thermal acclimation, the effect of predation by cormorants on winter flounder, regional winter flounder abundance trends, estimation of the winter flounder population in Mount Hope Bay, and the effects of stressors other than BPS on fish populations in Mount Hope Bay.

Response
EPA carefully considered all the points raised by RI DEM in development of this Response to Comments Document and the conditions in the Final Permit. EPA discusses these issues in great detail in its responses to comments made by PG&E-NEG throughout this document.

Response # IV.51	**Document #**: 1036, 1038, 1039, 1062, 1071, 1211

Comment
EPA received six comments expressing concern over the impact from entrainment and impingement of large numbers of fish eggs and larvae.

Response
Monitoring data from BPS document the large quantities of fish eggs, larvae, juveniles, and adults either entrained or impinged. For more detail, see Chapter 7 of EPA's July 22, 2002, Permit Determinations Document.

Response # IV.52	**Document #**: 1148

Comment
EPA did not sufficiently integrate all the individual factors affecting fish stocks and aquatic life in Mount Hope Bay. The commenter felt that if EPA integrated all these factors, it might find that the limits in its discharge permit are not sufficiently protective.

Response
Models have not yet been developed that will allow the Agency to estimate the integrated impact of entrainment and impingement mortality, thermally induced effects (lower egg survival due to temperature-enhanced predation, chronic mortality in juveniles, and temperature avoidance), and other factors. A theoretically complete analysis would examine the impact of all plant operations on every species in the bay and would be able to predict changes in each species' abundance and how those changes might affect one another. In an estuarine system like Mount Hope Bay that would involve hundreds of species and require more data than EPA could reasonably expect to gather in one person's lifetime. Developing an

integrated analysis, one that examines all life stages, for even one species is technically challenging. The Technical Advisory Committee (TAC) and PG&E-NEG's consultants worked on a cumulative impacts analysis that would use a modification of an existing population model called RAMAS. This application of the RAMAS model was an attempt to link fishing mortality, entrainment, and impingement losses from BPS with thermal discharge impacts on habitat suitability for winter flounder in Mount Hope Bay. Unfortunately, this modification did not produce results that could satisfactorily reproduce historical data, so EPA has no confidence in its ability to predict the future. Thus, EPA has not relied on the RAMAS model in any decision-making capacity. Absent an integrated model, EPA believes that conservative assumptions are warranted in looking at the impacts of the individual components (thermal discharge, entrainment, impingement). It is quite possible that the impacts from these individual stressors might not be simply additive in nature. However, the best assessment EPA can currently make is to use conservative assumptions for each individual stressor and use its best professional judgment regarding the acceptability of the cumulative impacts.

Response # IV.53	**Document #**: 1133

Comment
EPA received one comment stating that PG&E-NEG provided data on only a limited number of finfish species and did not include forage species or invertebrates such as lobster, crabs, mussels, and shrimp.

Response
For BPS and other power plant facilities, the resource agencies develop a list of Representative Important Species (RIS) and Critical Aquatic Organisms (CAO). The RIS and CAO lists are intended to look at commercially or ecologically important species within each specific receiving water. The RIS list for Mount Hope Bay includes the following species:

alewife	Atlantic menhaden	Atlantic nutworm
Atlantic silverside	bay anchovy	bluefish
blue mussel	eelgrass	four-eyed amphipod
hogchoker	quahog	rainbow smelt
sand lance	scup	seaboard goby
silver hake	striped bass	tautog
threespine stickleback	tube worm	weakfish
white perch	windowpane	winter flounder

The CAO list consists of only the finfish species listed above. For an analysis of the effects of PG&E-NEG's proposed § 316(a) variance-based thermal discharge limits, the permittee was required to provide a thermal analysis for each species on the RIS list. For an analysis of intake effects under § 316(b), PG&E-NEG was required to provide information for the species on the CAO list. Currently, no species of crab, lobster, or shrimp appear on either list, so PG&E-NEG was not obligated to submit data about these species. However, in EPA's review of potential thermal effects on Mount Hope Bay, it became apparent that the sand shrimp, *Crangon septemspinosa*, might have an ecologically significant role in Mount Hope Bay. Thus, these lists will be expanded in the future to consider (at a minimum) the sand shrimp. PG&E-NEG did an abbreviated analysis for impacts on blue mussels in their Partial Demonstration Document submitted in May 2001 and an analysis for quahog in their full variance submission submitted in December 2001.

Response # IV.54	**Document #**: 1005, 1019, 1146, 1180

Comment
Four commenters expressed concern about the biological impact of water withdrawal and thermal discharge from BPS on Mount Hope Bay.

Response
EPA believes that BPS's current operations are affecting Mount Hope Bay and the organisms that live there. EPA has designed the current permit to substantially reduce these impacts so as to assure the protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife in and on Mount Hope Bay. For more detailed information, see Chapters 6 and 7 of EPA's July 22, 2002, Permit Determinations Document.

Response # IV.55	**Document #**: 1160

Comment
One commenter stated that many economically important fish stocks have been affected by a myriad of stresses. Impacts on fish stocks from fishing are being aggressively limited by the New England Fishery Management Council, Atlantic States Marine Fisheries Commission, and the States of Rhode Island and Massachusetts. Evidence indicates that impacts on fisheries resources in Mount Hope Bay extend far beyond the results of fishing. Therefore, the commenter urged an aggressive approach to limit impacts from BPS.

Response
The Marine Research, Inc. (MRI) trawl survey measures fish abundance in the bay, which reflects the cumulative stresses felt by that population. The fact that fish stocks are statistically lower in Mount Hope Bay compared to adjacent Narragansett Bay suggests that a site-specific stressor is affecting those populations. EPA has set what it believes are appropriate limits to allow for the protection and propagation of a balanced indigenous population in Mount Hope Bay, and to assure that cooling water intake capacity reflects the Best Technology Available for minimizing adverse environmental impacts. EPA believes these limits will help allow for the recovery of the Mount Hope Bay ecosystem. This recovery effort will certainly require continued strong fishery management by Rhode Island, Massachusetts, the Federal government, and other partners, as well as continued efforts to control other pollution sources into the bay.

Response # IV.56	**Document #**: 1161

Comment
One commenter stated that the limits in the Draft Permit represent the minimum restrictions necessary to assure a recovery of Mount Hope Bay. The impacts associated with the limits in the Draft Permit are not insignificant. Any substantial increase in withdrawal rates above the proposed limits in the permit will likely result in violation of Rhode Island State water quality standards.

Response
EPA recognizes that the quantity of water withdrawn from the bay and the quantity of heat discharged back to it under this permit are not trivial. However, EPA has concluded that the limits in the permit will comply with CWA requirements. The reduction of more than 90 percent of the plant's impact on the bay should be a major step forward in the recovery of the Mount Hope Bay ecosystem.

Response # IV.57	**Document #**: 1161

Comment
One commenter gave comments on a technical report submitted to EPA by PG&E-NEG from Joseph DeAlteris. The commenter made the following points as to why the analysis by DeAlteris is flawed: (1) The DeAlteris analysis relies on data generated by the State of Rhode Island DEM and these data are not accurately represented in this analysis and (2) DeAlteris uses an index of abundance for winter flounder juveniles that had been dismissed by PG&E-NEG, their consultant MRI, and the TAC as an unreliable measure of juvenile winter flounder abundance.

Response
The RI DEM has informed EPA that DeAlteris's representation of the Rhode Island trawl survey was incorrect. After several exchanges of information between DeAlteris and the RI DEM, this mistake was rectified. DeAlteris assured the Agency that the changes were minor and had no material effect on his conclusions. He submitted amended summary statistic tables, per EPA's request, after the comment period had been closed.

DeAlteris also submitted an analysis of winter flounder abundance based on a survey conducted by MRI using 300-foot beach seines. This seine survey was not designed to sample winter flounder nursery habitat. As a result, from 1981 to 1997 the survey has averaged less than one fish per haul (excluding one unusually high sample in 1992). Thus, the TAC, BPS, and MRI subsequently devised a winter-flounder-specific beach seine survey using a 50-foot net at 10 stations. Catch rates are highly variable, but have been in the range of one to four winter flounder per haul. Statistical analysis of young-of-the-year winter flounder would be more appropriately done with results from the 50-foot net, which targets this species and is a more statistically robust data set because of a greater number of sampling stations. It is unclear why DeAlteris chose to use results from the 300-foot seine.

Response # IV.58	**Document #**: 1161

Comment
One commenter stated that since 1972 the facility has entrained more than 10 billion winter flounder larvae, which translates to more than 3 million age 3 recruits. In addition, the facility has added more than 1,100 tBtu of waste heat to Mount Hope Bay. Coincidentally, winter flounder in Mount Hope Bay declined to less than 10 percent of their former abundance. This dramatic decline has not been seen in other areas and the species is recovering in southern New England and Georges Bank.

Response
EPA agrees that the facility has taken large quantities of winter flounder, as well as many other species, since it first went into operation in the late 1960s. The exact magnitude of these losses is not quantifiable because, prior to the enactment of the CWA, BPS was not required to collect data and thus did not do so. Furthermore, to date data have not been collected for all bay resident species. EPA also agrees that the decline of winter flounder in Mount Hope Bay is dramatic and shows a different abundance trend than other discrete winter flounder populations. For a specific discussion on the thermal discharge effects, please see the discussion of § 316(a) section elsewhere in this document.

Response # IV.59	**Document #**: 1202

Comment
EPA received one comment stating that the data in reports submitted by RI DEM are misleading and that RI DEM selectively chose data to include in their analysis.

Response

The selection and interpretation of data is important in determining, first, whether there is an impact from BPS's thermal discharge and cooling water intake and, second, how significant that impact might be. Multiple finfish surveys exist for Narragansett Bay and Mount Hope Bay, each done with different gear, sampling effort, and objectives. Marine Research, Inc. (MRI) has been conducting trawl surveys with fixed stations since 1972. This data set is the most statistically robust for Mount Hope Bay. This survey has the greatest number of stations in Mount Hope Bay and the highest level of replication of any fish surveys in Mount Hope Bay. This survey was originally designed to examine changes in fish abundance in response to operations at BPS. RI DEM also conducts a fixed-station trawl survey, which uses one deep station and one shallow station in Mount Hope Bay. For this survey, deep water is defined as >20 feet deep and shallow water is defined as <20 feet deep. This sampling effort is part of a larger statewide survey, whose objective is to provide a statewide assessment of fisheries resources. Results from this survey are similar to those from the MRI survey in that few, if any, fish are caught in the shallow station and a slightly greater number of fish are caught in the deep station. Mathematically, at first glance it appears that the RI DEM trawl survey shows greater abundance than the MRI survey. This is in part due to the greater mathematical weight placed on the deep water station in the RI DEM survey. Since the deep station is one of only two stations, it contributes 50 percent to the average abundance value. In the MRI survey, the deep water station is one of six stations, thus contributing only 17 percent to the survey's average catch value. EPA estimates that 36 percent of Mount Hope Bay is more than 18 feet deep. Existing nautical charts provide depths in 6-foot intervals; thus, no exact estimate of areas of Mount Hope Bay less than 20 feet deep could be derived. EPA's estimate encompasses only 13 square miles of area and does not include significant amounts of the lower portions of the four rivers flowing into the bay. If these were included and precise bathymetric data were available to distinguish the 20-foot contour, it would greatly reduce the relative contribution of deep water to something much less than 36 percent. Thus, the weighting of deep water stations to the trawl survey abundance value is more appropriate for the MRI trawl survey than for the RI DEM survey based on the bathymetry of Mount Hope Bay. This is not to discount the RI DEM survey, whose trends support the notion of a dramatic fish decline and the absence of fish in the shallow waters of Mount Hope Bay. However, it is important to note that giving each station equal weight is not representative of the relative distribution of shallow and deep water in Mount Hope Bay and can produce a misleading result.

The BPS impingement data have also been suggested as a valid means of assessing fish abundance in Mount Hope Bay. EPA believes this is a qualitative measure at best and should not be used for quantitative analyses. For a full discussion of this, EPA refers the reader to responses regarding § 316(b) elsewhere in this document. In conclusion, EPA believes that RI DEM did have a valid reason not to treat all data equally.

That being said, Mark Gibson of RI DEM has undertaken an additional analysis that does treat all data sources equally. The end result is the same. His model predicts that to ensure any recovery in winter flounder in Mount Hope Bay, both overfishing and plant operations need to be stringently controlled.

Response # IV.60	**Document #**: 1042, 1053, 1091, 1070, 1211

Comment

Five commenters stated that reducing the level of heat and flow is necessary to allow for a recovery of finfish populations and the health of Mount Hope Bay.

Response

EPA recognizes that the cumulative impacts from BPS must be considered in developing permit limits to satisfy CWA requirements. In order to satisfy the standards of CWA §§ 316(a) and (b), EPA's discharge permit calls for substantial reductions in both intake flow and thermal discharge from BPS. EPA believes these reductions are warranted under the statute and should also help to facilitate the recovery of finfish populations and the marine environment in Mount Hope Bay.

Response # IV.61-65	**Document #**: 1004, 1012 1034, 1146, 1150, 1151, 1168, 1175, 1178, 1186, 1187, 1189, 1200, 1203, 1210, 1216, 1223, 1229, 1237, 1218

Summary
EPA received numerous oral and written comments on the cost of complying with the Draft Permit conditions. Most of these comments addressed either EPA's or the company's cost estimates of installing mechanical draft cooling towers at BPS.

61. Comment
One commenter expressed concern that "the EPA has underestimated the costs of installing new technology and the lost revenues that it will entail. ..." (1004) Another stated that the "cost of the measures required by the draft permit is wholly disproportionate to the environmental benefits." (1168) Another recommended that the "construction estimate for the closed loop cooling system should be redone/verified." (1012) Another commenter stated that "[a]ny decisions on the new draft permit should be based on realistic cost estimates to demonstrate that the agency is truly committed to fairness... [and that p]rior to the release of the permit, I would urge EPA to submit the project scope to another construction and engineering firm, more experienced in this type of work than EPA's existing consultant." (1178) Another commenter expressed concern over EPA's estimates because the estimates "ignore the specific conditions at BPS" and stated that EPA's estimates "failed to use appropriate construction rates burdened with all the realistic costs of a construction effort including workmen's compensation, payroll taxes, general and liability insurance and other costs incidental to construction." (1216).

Response
Introduction

EPA more fully discusses its obligation to consider costs under the Clean Water Act (CWA) in the July 2002 Permit Determinations Document and elsewhere in this response to comments. However, it is worth repeating here that EPA is not required to develop precise cost information under the CWA. While EPA is required to reasonably **consider** cost, that consideration is "a relatively subsidiary task and need not be **precise** (emphasis added)." *Eli Lilly and Company* v. *Costle*, 598 F.2d 638, 656 (1st Cir. 1979). EPA believes it has gone well beyond this legal requirement in estimating the cost of retrofitting BPS to closed-cycle cooling.

EPA acknowledges that BPS hired an experienced power plant construction and engineering firm to produce its cost estimates (Stone and Webster). Stone and Webster produced spreadsheets and cost estimates for several technologies which could be employed at BPS to reduce its impact on Mount Hope Bay (e.g., helper towers, closed-cycle cooling, variable speed pumps). These estimates were provided to EPA in the company's December 2001 § 316(a) and 316(b) Demonstration Document (see AR 192). In response to the Draft Permit, the permittee also retained Bechtel Corporation to submit comments on Stone and Webster's estimate. See Brayton Point Station, Brayton Point Comment Summary & Response, report by SAIC (Appendix O). It should be noted that Bechtel Corporation did not produce a new cost estimate. It simply commented on Stone and Webster's (and SAIC's) work.

Both of the permittee's engineering firms recognized that the estimates provided to EPA are "order of magnitude" estimates based on preliminary engineering design and, as such, should only be considered accurate to within +/- 25 percent. Furthermore, Stone and Webster include an additional 10 percent for contingencies and an additional 10 percent increase for "indeterminates" in its estimates. While they describe these as reasonable additions for this level of design, the adjustments are a further indication that the costs submitted to EPA by Stone and Webster, and reviewed by Bechtel Corporation, should not be viewed as **precise** estimates. Rather, they should be considered rough, or "order of magnitude" estimates. EPA is under no obligation to develop costs to a more accurate level of detail than the company has provided to date. Rather, EPA is required only to **consider** costs in the development of the permit pursuant to CWA requirements.

While EPA has carefully considered the permittee's cost estimates and its comments concerning cost, it was also reasonable for EPA to independently evaluate the cost of the relevant options, rather than just accept the company's estimates. EPA procured the services of a reputable engineering firm (SAIC International Inc.) to assist in reviewing the capital and operational cost(s) of conversion. EPA also obtained the services of Abt Associates Inc., a firm with extensive financial and economic expertise, to conduct a financial/economic analysis to determine the cost to the permittee over time of installing and operating new technology at BPS.

In response to comments concerning SAIC's work, EPA acknowledges that SAIC, as a firm, is not in the business of power plant design and construction. SAIC personnel do, however, have individual experience in the design and construction of power plants. The combination of SAIC's independence from the power plant industry as a firm, which eliminates potential conflicts of interest, and the fact that its personnel have knowledge and experience with power plants, makes SAIC well suited for the task of considering, on behalf of EPA, the costs of retrofitting BPS with mechanical draft cooling towers. Using SAIC was also cost-effective for EPA given that the company had already been retained to assist EPA with similar types of issues in the development of CWA § 316(b) regulations. Such cost efficiency is a significant consideration given limited Federal funds. No comments were raised concerning the adequacy of Abt's expertise.

EPA believes it has provided an appropriate level of consideration of costs for this project using SAIC and the cost estimation methods it developed. SAIC used two separate and distinct methods to develop two reasonable and appropriate estimates of capital costs. Nevertheless, in considering the comment regarding using another engineering firm to develop costs, EPA investigated using the services of a company in the business of, among other things, constructing and installing cooling towers at large industrial facilities (Hatch Associates) to develop another cost estimate. EPA transmitted the information that Stone and Webster had developed on behalf of the permittee to Hatch Associates (the project scope), and asked Hatch Associates to review the material. EPA then received a quote from Hatch for the cost to provide another "order of magnitude" estimate of the cost of converting BPS to closed-cycle cooling. Hatch estimated that it would cost nearly $300,000 to produce such an estimate.

EPA decided that expending such a sum for yet another estimate of the cost of closed-cycle cooling at BPS would be unjustified since EPA had already devoted significant public resources to developing cost estimates using SAIC (including evaluating the permittee's estimates, responding to comments on SAIC's estimates, and having SAIC personnel conduct a site visit). Therefore, EPA disagrees that it should submit the project scope to another engineering firm to get another cost estimate (in effect, a third cost estimate). EPA believes it has gone well beyond its minimum legal obligation to consider costs.

As previously stated, SAIC used two separate and distinct methods to assist EPA in its consideration of costs for the permit, namely, the "316(b) costing methodology" and the "line-by-line" approach. EPA believes both methods are valid ways to consider the costs of converting BPS to closed-cycle cooling to support the development of CWA § 316(b) limits for the BPS permit. The § 316(b) costing methodology is generic industry-wide costing approach used to support a national rulemaking. It is not site specific in orientation, although it does include a regional cost adjustment factor and its application for BPS incorporated some site-specific considerations, such as using saltwater (rather than freshwater) for cooling. The line-by-line analysis, however, is a site-specific method. It used Stone and Webster's design, including the size of the cooling tower array and the amount of material necessary (e.g., pipes, pump sizing), to convert the BPS plant to closed-cycle cooling. The line-by-line method is therefore considered a site-specific analysis. For the Draft Permit, the estimates from the two analyses were relatively close together, but since the § 316(b) costing methodology yielded the higher of the two estimates, EPA conservatively chose to use its results in its cost assessment.

EPA received considerable comment on both methods and has revised both methods as appropriate in response to these comments. Specific responses to these comments are presented in detail in memoranda prepared by EPA's consultants. EPA worked with its consultants in developing these memoranda, independently evaluated them, and incorporates them by reference into these responses to comments.

Cost Considerations and Plume Effects

The cost of retrofitting BPS with mechanical draft cooling towers could be influenced by the potential vapor plume-related impacts from cooling towers and the associated costs to mitigate them. For a more detailed discussion of the plume-related impacts, see MFG's report "An Evaluation of Cooling Tower Plume Studies Done for the Brayton Point Generating Station." See Appendix M. A brief discussion of the potential plume issue as it relates to the mitigation costs is presented below. The vapor plume issue is also discussed in Chapter 7 of the July 22, 2002, Permit Determinations Document and elsewhere in these responses to comments.

In brief, mechanical draft cooling towers work by using the atmosphere to dissipate waste heat. Instead of returning heated water to Mount Hope Bay as presently happens, the heated water would be sprayed into the top of mechanical draft cooling towers. The droplets of water then travel down the "fill" of the cooling tower. Large fans at the top of the cooling tower draw in air in a counter-current direction to the falling water droplets. As the air contacts the droplets, the water is cooled primarily (although not entirely) through the process of evaporation. The evaporated droplets are expelled at the top of the cooling towers, resulting in the emission of water vapor.

Because the air exiting the cooling tower is almost always fully saturated with water (i.e., 100 percent humidity), the plume usually condenses immediately after exiting the cooling tower and then reevaporates at some downwind point. In general, condensed plumes remain aloft and evaporate before contacting the ground. Meteorological conditions dictate the exiting plume characteristics. For example, under some conditions, it is possible for the plume to come in contact with the ground, resulting in a condition called "fogging," or, in colder weather, an "icing" condition. Both of these impacts are undesirable as they have the ability to present potentially hazardous driving conditions. It is important to note that cooling tower technology is well established and has been used for decades at power plants and in many other industrial applications throughout the world. Plume-related concerns are hardly unique to the use of cooling towers at BPS and, in most cases, are satisfactorily addressed through proper sizing and siting of cooling towers or by using certain available technologies.

The choice of technique for addressing potential plume concerns affects the cost estimate for the cooling tower(s) conversion at BPS and is therefore discussed below. While it is uncertain whether significant vapor plumes would arise at BPS from the use of cooling towers, EPA believes the possibility made it reasonable to consider the issue in greater detail. As a result, EPA evaluated several ways of abating plume concerns at BPS (and the resulting costs). These methods are as follows: (1) shut down the cooling towers **and** the associated generating units during times of predicted plume impacts, (2) install "bypass" technology that allows the facility to bypass the cooling tower and switch to once-through cooling during times of predicted plume impacts, and (3) install well-established plume abatement technology (hybrid cooling towers) to eliminate plume-related impacts. Two additional alternatives (an enhanced traffic safety management program; and resiting and/or reconfiguring some or all of the cooling towers) are not reevaluated in this response to comments, although EPA believes they remain potential mitigation measures available to the company, as was discussed in Chapter 7 of EPA's July 22, 2002 Permit Determinations Document. EPA also notes that these methods are not mutually exclusive; that is, they may be used in combination depending on what the company determines to be the optimal way to address the concern. For example, the permittee could install hybrid cooling towers for some generating units, while equipping some or all of the others for possible bypass or relying on unit shutdowns.

Cooling Tower and Associated Generating Unit Shutdown

The company has estimated the cost of implementing an entire station closed-cycle system using generating unit shutdowns to avoid vapor plume problems. For this option, the company proposes that it would shut down the cooling tower(s) and associated generating unit(s) during times when the company anticipates icing or fogging. The company then calculated the resulting lost revenue and included it in the estimated cost of converting the station entirely to closed-cycle cooling using mechanical draft cooling towers.

EPA has identified several concerns with this approach. First, to EPA's knowledge, this would be an atypical solution to the problem. EPA has not identified any facilities that shut down generating units as a way of abating cooling tower plumes. This seems an especially anomalous approach for a baseload generating facility. The company itself admits that the generating units are not designed to operate under such conditions and expresses concern that such operations could damage the units and supporting equipment.

A second concern with this approach (especially regarding estimating costs) is that predicting the number of hours of shutdown that might possibly be required is a highly speculative task. The permittee based its estimate on a theoretical model and an assumed price of electricity during these shutdowns. EPA has identified several apparent problems with the company's modeling effort that result in an inadequately justified, excessive predicted number of plume-induced shutdowns hours (see MFG report, Appendix M). The problem of estimating the cost of unit outages is compounded by the difficulty of predicting future electricity prices.

Despite the concerns discussed above, EPA did not simply reject the company's approach. Instead, the Agency evaluated it and at least partially addressed its concerns by developing a range of costs for possible generating unit shutdowns. On one end is the case of zero plume-induced shutdowns, and on the other end is the company's full estimate of plume-related shutdowns. EPA has analyzed both cases, and the results are presented later in this response. It should be noted that, at this point, EPA believes using this mitigation measure produces the least-accurate cost estimate. (It should also be noted that EPA assessed the cost of a range of generating unit shutdown scenarios for the Draft Permit as well.)

Cooling Tower Bypass During Times of Predicted Plume Hazard

The bypass technology as designed for BPS is based on the company's concept of the so-called "Enhanced Multi-Mode" (EMM) system. The EMM system would use a 20-cell tower, interconnected to Units 3 and 4, and equipped with the necessary plumbing and valving to allow the cooling tower to be bypassed during times of predicted plume effects. The company has explained that it would develop predictive weather criteria which would be used to determine when the potential exists for a hazardous icing or fogging condition (the company would also do this if the generating unit shutdown option is selected). The unit would then be switched to once-through cooling. EPA notes that this approach is similar in concept to other facilities that use cooling towers seasonally, essentially employing "bypass" technology to switch from open-cycle to closed-cycle cooling to abate certain seasonal environmental concerns. BPS acknowledges that this type of operation is used at the Dresden Nuclear Plant.

EPA has developed cost estimates to implement a bypass solution at BPS, and the results are presented below. The company, even in its comments on the Draft Permit, did not develop its own cost estimates for bypass technology. EPA notes, however, that bypass capability is a central part of the permittee's EMM proposal, for which the company did provide a cost estimate. The permittee questioned EPA's estimate of the cost of adding bypass capability, but after considering those comments, EPA has concluded that its estimate of costs for this approach is reasonable. The permittee's comments in this regard are addressed in detail the following two reports by the Agency's consultant, SAIC: "Brayton Point Station, Brayton Point Comment Summary & Response" and "Brayton Point Station, Revisions to and Results from the Clean Water Act §316(b) Cost Methodology for the Brayton Point Station" (Appendices O and P, respectively).

Some commenters stated that the number of hours of bypass allowed by the permit were excessive, would result in adverse environmental impacts, and were inconsistent with the technology standard requirement of CWA § 316(b) and State water quality standards. These comments are addressed elsewhere in this response to comments. The company, however, commented that the number of hours allowed for bypass operation under the Draft Permit was insufficient because they do not cover the full number of generating unit shutdown hours that the company's model predicts would be needed to avoid any possible plume hazard. EPA disagrees with this comment for several reasons.

First, EPA wants to be clear that, as explained elsewhere, EPA did not base the number of bypass hours allowed in the permit on an assessment of how many hours might or might not be needed to eliminate any plume-related concerns. Rather, the number of bypass hours is based on the hours of once-through thermal discharges that the Agency has determined could be permitted while still satisfying the biological standard of § 316(a) of the CWA. EPA also concluded that the marginal flow increase associated with those hours of bypass operation would not run afoul of the CWA § 316(b) requirement that intake capacity limits reflect the best technology available for minimizing adverse environmental impacts. In addition, EPA also noted that allowing some hours of bypass capability in the Final Permit would give the company additional operational flexibility to address plume-related concerns if they became an issue.

Second, as discussed above, in MFG's report, "An Evaluation of Cooling Tower Plume Studies Done for the Brayton Point Generating Station" (see Appendix M) and in EPA's Draft Permit Determinations Document, EPA presently has little confidence in the company's current hourly estimate of plume-induced effects or that the plume issue will create a hazard necessitating a technological fix. Only actual operating experience can determine how many hours, if any, of bypassing the cooling towers area is likely to be necessary to prevent adverse impacts. In the meantime, however, the 122 hours of bypass operations allowed by the permit would add operational flexibility.

Third, EPA points out that the number of hours of shutdown (or bypass) that the permittee calls for is much greater than the number of hours of actual icing or fogging predicted by its model. This is because the permittee sets an extremely (and perhaps excessively) conservative trigger point for shutting down units to avoid development of a plume problem. Since the construction of the cooling towers will take a number of years, EPA expects that the permittee would have time to refine and relax this trigger point if it chooses to handle any plume problems with unit shutdowns and/or cooling tower bypasses.

Finally, EPA points out that its current approach is reasonable based on the currently available information and the numerous uncertainties related to these issues. If experience shows that a different approach might be warranted, new permit conditions with regard to bypass hours can be assessed either for permit reissuance or in response to a permit modification proposal.

EPA's capital cost estimate for employing bypass technology is presented below. (See SAIC and Abt for a complete report on the development of bypass capability and its costs - Appendices S and A, respectively).

Plume-Abatement Technology

The most common, and definitive, method of addressing plume-related concerns from cooling towers is to equip the towers with technology that abates the plume so that plume impacts are eliminated. Cooling tower manufacturers offer plume-abatement technology that can be added (in some instances after installation) to standard mechanical draft cooling towers. This type of technology is referred to as a "wet/dry" or "hybrid" tower. This is discussed in § 7.4.a.1(C) of EPA's Draft Permit Determinations Document. Basically, the plume is heated before it leaves the tower. This additional heat raises the plume height and the temperature of the plume so that the plume is no longer saturated with water (less than 100 percent humidity), thereby allowing the plume to mix with the surrounding air before the water vapor in the plume has a chance to condense. This technology is widely used to abate plume effects and has the added benefit of reducing the visibility of the plume, which can be considered aesthetically unpleasing. See *Id.*

EPA has also considered the additional cost of outfitting the cooling towers with this technology (see SAIC report - Appendix S), and those results are presented below. EPA notes that the permittee also submitted cost estimates based on using plume-abatement technology. The results of that analysis are also presented below.

In summary, the company is presented with the possibility of using some **combination** of technologies and/or shutdowns to address any vapor plume hazard concerns. Further, as indicated in §§ 7.4.a.1(C) and 4.5.2a of the July 2002 Determinations Document, EPA maintains that roadway precautions, such as the use of salt and sand to control icing, might also be effective in reducing any potential plume hazards.

Revised Capital Cost Estimates

EPA has made certain revisions to both of its capital cost-estimating methods (the § 316(b) methodology and the line-by-line approach) in response to comments received on the Draft Permit. The changes are not discussed here but are presented in Appendices O and P. EPA believes that the revisions made are reasonable and consistent with its conservative approach to cost estimation for this permit. Generally, the changes have resulted in somewhat higher capital cost estimates than developed for the Draft Permit. EPA's estimates continue to be lower than those presented by the permittee.

The following table shows EPA's revised capital cost estimates (for entire-station closed-cycle cooling) based on its revisions to these two cost-estimating methods. It also presents Stone and Webster's capital cost estimates (one with plume-abatement technology and one without).

Summary of Revised SAIC Capital Cost Estimates for the § 316(b) Rule and Line-by-Line Cost Estimation Methodologies, and for Stone and Webster's (S & W) Cost Estimates

Technology and Methodology	Capital Cost Estimates, $ millions			
	Units 1+2	Unit 3	Unit 4	All Stations
SAIC OPTION A: **§ 316(b):** Fiberglass towers, retrofit, salt water (SW)	39.1	31.5	29.6	100.2
LbL: Closed cycle*	42.3	32.7	28.3	103.3
SAIC OPTION B: **§ 316(b):** Fiberglass towers, retrofit, SW, and plume abatement	52.5	42.3	39.7	134.5
LbL: Closed cycle with plume abatement *, **	56.7	43.7	38.6	139.1
SAIC OPTION C: **§ 316(b):** Fiberglass towers, retrofit, SW, and multi-mode	48.4	39	36.5	123.9
LbL: Closed cycle with multi-mode (bypass) factor*	52.8	40.9	35.4	129.1
Stone and Webster OPTION A S & W closed-cycle costs without plume abatement*, **	72.3	56.4	48	176.7
Stone and Webster OPTION B S & W closed-cycle costs with plume abatement*, **	---	---	---	247.6

* Like the § 316(b) method estimates reported in this table, the line-by-line options and the Stone and Webster capital cost estimates also assume the use of fiberglass towers, retrofitting at BPS, and capability to use saltwater.

** "Plume abatement" means "installing cooling towers that have the technological capability to abate plumes during operations." The permittee stated that adding this "capability would add roughly $70.6 million onto the costs of the Entire Station Closed-Cycle option."

During the development of the Draft Permit, the § 316(b) methodology yielded the higher of EPA's two capital cost estimates for entire-station closed-cycle cooling with bypass capability (though these two independent estimates came out fairly close together, giving the Agency additional confidence in their reasonableness). Therefore, to be conservative, EPA carried these higher capital cost estimates forward into its overall cost assessment. After modifying the two methods in response to comments received, however, the line-by-line method produced the higher capital cost estimate. Therefore, consistent with its approach to the Draft Permit, EPA carried the new higher capital cost estimate from the line-by-line analysis forward into its overall financial cost assessment.

EPA also notes that the permittee provided additional comments relevant to EPA's capital cost assessment in a July 30, 2003, submission to EPA. This submission from the permittee appended additional pertinent comments from its consultant, Robert Stavins (July 29, 2003). EPA has also reviewed and considered these comments. The permittee argues that certain analyses conducted by the Department of Energy (DOE) that estimate cooling tower retrofit capital costs at other facilities, and potential revised estimates by EPA in the context of the developing national § 316(b) rulemaking for existing power plants of unit outages for conversions at nuclear power plants, indicate that the region's capital cost analysis based on the § 316(b) method for BPS is incorrect and the permittee's analysis is correct. EPA has reviewed and considered the permittee's comments (including those of Robert Stavins), as well as the DOE reports, and does not think they warrant any changes to its analysis. This is discussed in detail in the Memorandum by Damien Houlihan, EPA, to the BPS File (September 24, 2003). See Administrative Record No. 3190. EPA will make only a few points here. First, as discussed above, the Region's capital cost estimates for the Final Permit are based on the site-specific, line-by-line method, rather than the § 316(b) method, although it believes the § 316(b) method remains valid, especially with the adjustments it has made for its site-specific application to BPS in response to comments. The DOE analysis regarding other power plants does not change that. Second, with respect to possible revisions regarding EPA headquarters' national estimates for retrofit-related unit outages at nuclear power plants, the Region also does not believe this is a basis for changing the site-specific estimate of unit outages at BPS. EPA headquarters only indicated it is considering or adopting changed outage estimates for nuclear power plants, which have a host of additional safety and regulatory issues different from those at fossil fuel-fired plants. BPS is not a nuclear plant. EPA continues to believe its site-specific estimate for BPS was reasonable.

Revised Cost Analysis of Closed-Cycle Cooling

EPA received comments on its overall financial analysis of the cost to convert BPS to closed-cycle cooling. EPA has responded to those comments and revised its cost analysis as appropriate. These responses are presented elsewhere in this document and in memoranda by our consultants. See Memorandum by Abt Associates, Inc., prepared for U.S. Environmental Protection Agency, Region 1 Office, "Cost Analysis of Closed-Cycle Cooling Tower System for Management of Thermal Discharge and Cooling Water Intake for BPS" (August 20, 2003).

The revised cost estimates incorporate capital and other initial costs, including construction duration and construction outage, and annual operating costs, such as maintenance expenses, auxiliary power consumption, and efficiency losses. The revised analysis also considers the capital outlay schedule, the discount rate, the useful life of the equipment, the construction start date, tax considerations, and the economic gains to the company due to its ability to generate more electricity during hot weather periods as a result of using cooling towers (the "avoided load loss"). Comments concerning these issues are addressed elsewhere in these comments as well as in memoranda by its consultants, Abt Associates, Inc. and SAIC.

Several analytical cases were considered based on different economic assumptions and different approaches to addressing any vapor plume issues, and the reader is again referred to the August 20, 2003 report, "Cost Analysis of Closed-Cycle Cooling Tower System for Management of Thermal Discharge and Cooling Water Intake for BPS" by Abt Associates, Inc. for a detailed explanation of the cases considered. The following table shows the key results of the analyses by both EPA and the permittee:

Summary of Company and Abt Associates/EPA Analyses: Cases Analyzed and Summary Results for Previous and Current Analyses

	Company Analyses*				Abt Associates/EPA Analyses**			
All values ($000,000)	November 2001 Analysis		October 2002 Analysis		April 2002 Proposed Permit		Final Permit Analysis	
	Discount Rate		Discount Rate		Equipment Life		Equipment Life	
Present values are at	15%	20%	15%	20%	20-year	30-year	20-year	30-year
With Modification for Plume Hazard Abatement								
Multi-Mode/Bypass Capability								
Present value	Not analyzed by company				$68.4	$68.0	$107.2	$109.6
Equivalent annual cost					$9.0	$8.3	$15.7	$15.1
Hybrid Cooling Tower	Not analyzed by company				Not analyzed at proposal			
Present value			$278.3	$276.8			$119.7	$120.2

Equivalent annual cost			$44.5	$56.8			$17.6	$16.6
With No Plume Abatement Modification								
Full Plume Abatement Impact								
Present value	$254.5	$250.3	$229.8	$220.4	$83.3	$85.8	$109.2	$111.2
Equivalent annual cost	$40.7	$51.4	$36.7	$45.3	$11.0	$10.5	$16.0	$15.4
No Plume Abatement Impact								
Present value	Not analyzed by company				Not analyzed at proposal		$88.3	$88.3
Equivalent annual cost							$13.0	$12.2

*see page 29 of Abt's memorandum "Cost Analysis of Closed-Cycle Cooling Tower System for Management of Thermal Discharge and Cooling Water Intake for BPS" for an explanation of the slight difference in the equivalent annual cost listed here and what the company produced.

** the Abt/EPA estimates used a discount rate of 11.8 percent for the Draft Permit analysis, but increased that to a rate of 13.5 percent for the Final Permit analysis.

EPA has carefully considered the expected costs of meeting the Final Permit conditions using mechanical draft cooling towers. EPA's various approaches to estimating these costs yielded a range of present value, total costs depending on the analytical case being analyzed from a low of $88.3 million to a high of $120.2 million (equivalent annual costs range from $12.2 million to $17.6 million, depending on the assumed useful life of the equipment). Since the Draft Permit, EPA's cost estimates went up somewhat and the permittee's estimates came down somewhat, but the permittee's estimates remain higher (by two to three times, depending on which figures one is comparing).

For a detailed discussion of EPA's cost analysis for the Final Permit, see the August 20, 2003 report, "Cost Analysis of Closed-Cycle Cooling Tower System for Management of Thermal Discharge and Cooling Water Intake for BPS" by Abt Associates, Inc. In addition, the application of the "wholly disproportionate" cost test is discussed elsewhere in this document.

Additional Factors to Consider in Determining the Cost of Retrofitting BPS

EPA has also taken into account several other cost considerations regarding retrofitting BPS with mechanical draft cooling towers. These other factors include complying with noise requirements, including the service water flow into the design of the cooling system, and the final design or size of the cooling tower array. Each of these factors is discussed in more detail below.

Noise.

The issue of noise resulting from the operation of cooling towers at BPS will be subject to further review during subsequent DEP permitting. The Commonwealth of Massachusetts has noise regulations (310 CMR 7.10) that must be complied with to address community concerns. Mechanical draft cooling towers might affect ambient sound levels in the surrounding community. To date, the company has not provided sufficient information to fully evaluate the potential noise impacts and possible mitigation measures associated with cooling tower operation at BPS. BPS will have to submit additional detailed information to the DEP pertaining to noise impacts and mitigation measures before it can receive the necessary approvals to construct and operate cooling towers. (There are no applicable Federal noise requirements.)

DEP's air quality permit review will include application of the DEP noise guidance relating to the proposed cooling technology. As part of this evaluation, DEP will require BPS to assess the potential noise impacts in comparison to existing background noise levels. The review will examine the source of additional noise; ways to minimize noise; and whether or not the noise impacts can be addressed beyond the property boundary of the noise source, if the impacts were to exceed the applicable quidelines. Until the DEP's noise review and related approvals are issued it is unclear what, if any, noise mitigation will be needed for a cooling tower installation at BPS.

Despite the lack of Federal noise requirements and the future, independent application of State noise requirements by the DEP, EPA nevertheless investigated potential ambient noise increases from converting BPS to a closed-cycle cooling tower system in an effort to be as thorough as possible in the consideration of costs and community environmental impacts. EPA's noise evaluation is presented in the report by Hatch, Inc., prepared for U.S. Environmental Protection Agency, Region 1 Office, and Tetra Tech, Inc., "Brayton Point Power Station Cooling Towers - Noise Impact Assessment" (September 29, 2003). See Appendix L. EPA participated in the development of this report, has independently reviewed and evaluated it, and incorporates it by reference into these responses to comments. This evaluation also considered the costs of noise mitigation measures that might potentially be needed. EPA responds to comments regarding noise issues apart from cost considerations elsewhere in these responses to comments.

Based on its review of current information, EPA has concluded that although installation of cooling towers could result in noise impacts requiring mitigation, such mitigation can be accomplished and Massachusetts regulations can be satisfied using established technology known to the industry. While noise control measures beyond a simple low noise cooling tower could be needed to accomplish this mitigation, it is impossible at this time to be sure what additional measures, if any, would be called for. Nevertheless, it is clear that a range of suitable measures exists among the state-of-the-art technologies to properly control noise emissions.

EPA's consultant communicated with cooling tower equipment vendors to develop a range of cost estimates for various levels of noise mitigation. This information indicates that cooling towers equipped with different degrees of noise control equipment could be needed to meet Massachusetts regulations and that cooling towers so equipped could range in price from approximately $28.5 million to $39 million, depending on the level of noise control required and the manufacturer. See "Brayton Point Power Station Cooling Towers - Noise Impact Assessment" by Hatch, Inc., prepared for U.S. Environmental Protection Agency, Region 1 Office, and Tetra Tech, Inc., Appendix L. Cooling towers equipped with these measures, therefore, could cost somewhat more than the $25.2 million for cooling towers that Stone and Webster estimated. It should be noted that the above-referenced figures reflect the cost for design, supply, and installation of the cooling towers, but do not reflect other related construction costs such as excavation, construction of the cooling tower basin and foundation. Stone and Webster's total cooling tower cost estimate, **including** these cost elements, is approximately $47 million. Yet, the extent of noise abatement features included in this cost estimate by Stone and Webster is unclear. EPA used the Stone and Webster total cooling tower cost estimate (i.e., $47 million) in developing its independent capital cost estimate using the "line-by-line method."[26]

EPA concludes that it is reasonable to continue using the Stone and Webster estimate in the Agency's line-by-line cost estimate without increasing it for additional noise mitigation. This conclusion is based on several points. It is impossible at this juncture to be predict what, if any, additional noise mitigation will be needed as a result of the MA DEP's noise review and approval process. The permittee will need to apply for approvals to the MA DEP and include a noise analysis of its own. This review process will

[26] EPA used a somewhat higher figure ($52 million) in developing its estimate under the 316(b) cost estimation method. Due to other factors in the evaluation, the overall total cost estimated by the line-by-line method ended up being higher than the cost estimated by the § 316(b) method. As a result, EPA carried results from the line-by-line method analysis forward for its detailed cost analysis. This is discussed in more detail elsewhere in this response to comments document.

ultimately determine the level of mitigation, if any, that is required. Moreover, it is unclear what degree of noise abatement features are already reflected in the Stone and Webster cooling tower cost estimate. The noise analysis by EPA's consultant Hatch was not meant to, and could not, serve as the basis of the MA DEP's regulatory decisions regarding noise. Hatch's noise analysis provides information on possible noise effects and means of noise control in order to evaluate the feasibility (or infeasibility) of operating cooling towers at BPS that would satisfy MA DEP noise requirements. Having demonstrated that attaining such compliance was feasible, EPA also asked Hatch to provide an estimate of the possible cost of installing cooling towers including potentially needed noise mitigation measures. As mentioned above, Hatch determined that one manufacturer indicated it could provide cooling towers with any needed noise control features for about $28.5 million, while a second manufacturer estimated it could provide the cooling towers with various levels of noise mitigation for prices ranging as high as $39 million. Yet, as stated above, it is unclear what if any additional measures may be needed.

Therefore, EPA could not determine a reasonable amount to add to the $25.2 million figure. The Agency does not think this makes a significant difference because one vendor's estimate is only about $3 million more that Stone and Webster's estimate, and because neither estimate would add more than from 3 to 15 percent to the overall capital costs estimated by EPA for closed-cycle cooling for all four generating units at BPS. (Obviously, the percentage increase would be even less for the permittee's higher capital cost estimates.) See also AR 3215 (regarding possible effect of noise mitigation on total cost, as opposed to capital cost). These values are well within the 25 percent margin of error for the present cost estimates, and would also be largely covered by the permittee's allowance for indeterminates and contingencies. Finally, the estimates provided by Hatch include additional cost resulting from including the service water flow in the design requirement of the entire station closed-cycle (see below). In other words, the increased cost of the estimates obtained by Hatch are not solely due to noise mitigation.

Service Water Flow.

As discussed elsewhere in this response to comments document, the company claims that service water flow was not included in EPA's design of the entire station closed-cycle system.

EPA has considered the cost of using cooling towers designed to handle the additional service water flow (see Appendix B to the Hatch report, which considered both noise control treatment and the use of cooling towers large enough to treat the service water). EPA determined that using cooling towers capable of handling the additional service water flow can be purchased for between $28.5 million and $39 million. As discussed above, EPA has decided that no upward adjustment is necessary to account for the additional volume of service water because it does not appear that the marginal cost increase would be significant and EPA cannot determine from the available information what portion of the increased cost relates to this element and what portion relates to noise mitigation. EPA also notes that it used the permittee's own capital cost estimate for the cooling towers. Therefore, if the permittee failed to identify additional costs attributable to the service water flow in its cost estimates or comments on the permit, EPA cannot be faulted for doing the same.

Final Design of Cooling Towers

Stone and Webster, on behalf of the company, submitted an engineering design for the number of cooling towers and the number of cells per cooling tower required for the entire station closed-cycle system. This design calls for a total of 72 cells for the entire facility, broken down as follows:

- Units 1 and 2 - 30-cell cooling tower (combined)
- Unit 3 - 22 cells

- Unit 4 - 20 cells

EPA notes that the company's "enhanced multi-mode" design calls for a cooling tower containing 20 cells.

For its cost assessment for the Draft and Final Permits, EPA simply accepted the permittee's proposal of a 72-cell cooling tower array. However, for the Final Permit, EPA has also independently evaluated Stone and Webster's 72-cell design for entire station closed-cycle. Based on this evaluation, EPA has concluded that Stone and Webster's apparent flow-based cooling tower size scaling method (from the enhanced multi-mode design to the entire station closed-cycle design) appears to have resulted in a substantial overestimation of the number of cells per cooling tower required for the entire station closed-cycle system. One independent analysis conducted for EPA concluded that the number of cells might have been overestimated by approximately 24 percent (58 cells versus 72 cells) (see SAIC report - Appendix T).

Since the number of cells per cooling tower affects a variety of important factors such as noise and potential plume impacts in addition to costs, EPA asked its expert consultants to independently evaluate the number of cells per cooling tower needed at BPS as part of their analysis (Hatch Associates, regarding noise, and MFG, Inc., regarding plume impacts). Both of these contractors also concluded that Stone and Webster overestimated the number of cooling tower cells required to cool BPS.

Hatch Associates, as part of its noise analysis, submitted the design parameters as given by the company to cooling tower vendors and requested that these vendors determine the design (and costs) needed to meet these given parameters. It should be noted here that Hatch also included the service water flow in the information given to the cooling tower manufacturers, something that the company failed to include in its design parameters. Manufacturers 1 and 2 estimated that the required number of cells was 66 and 56, respectively. This is a further indication that Stone and Webster's design overestimated the required number of cells, especially since Hatch Associates included larger flows to the towers to incorporate the additional service water flow.

MFG, Inc., as part of its plume impact analysis, reevaluated the number of cells required to handle the thermal load of BPS. MFG reasonably assumed that the permittee's consultant, EarthTech, used the same 1.43×10^8 Btu/hr per cell for its entire station closed-cycle CALPUFF plume modeling, as the permittee's other consultant, TRC, Inc., did in its Enhanced Multi-Mode CALPUFF plume modeling effort. MFG also concluded that the 1.43×10^8 Btu/hr per cell heat rejection rate per cell is a reasonable value for BPS. Based on application of this per cell value to the full plant design of 72 cells, the calculated total heat load rejected would be about 90 TBtu/year, assuming, as EarthTech apparently has, that all cells are running continuously at full load for the year. The plant is currently limited to 42 TBtu/year, and the company reports that its heat load is actually less than 42 TBtu/year. EarthTech's modeling clearly appears to have assumed a much greater total heat load than would actually be rejected by the plant.

Understanding that the design of the cooling towers should be based on maximum capacity, MFG concluded that even at the maximum rate, too much cooling has been assumed to be needed. MFG calculated the maximum cooling tower needs based on an energy balance of BPS. Even with all units running at full load, MFG computed that the maximum number of cooling tower cells required is approximately 60 (at a heat rejection rate of 1.43×10^8 Btu/hr per cell).

MFG's analysis leads to two important conclusions. First, it is likely that the cooling tower plume impacts studies were performed with assumptions involving much greater water vapor emissions than would ever occur at BPS. Second, the company has likely overstated the number of cells and therefore the size (and cost) of the cooling towers required to implement entire station closed-cycle cooling at BPS (see MFG report, Appendix M).

Therefore, in summary, EPA has concluded that Stone and Webster has significantly overestimated the size (and cost) of the cooling tower array needed to convert BPS to closed-cycle cooling using mechanical draft cooling towers. This conclusion is based on three analyses, conducted independently and using different methods. EPA believes that Stone and Webster incorrectly scaled from the 20-cell enhanced multi-mode system, thereby also overestimating the cost of the cooling towers themselves. In addition to this overestimation, this error was carried forward and affected the plume model submitted by the company, the comments on noise submitted by the company, and the concerns about space restraints for construction raised by the company.

EPA notes that the company could further reduce the number of cells required by increasing the approach from 8 to 10 °F (that is, increasing the cooling tower outlet temperature from 85 to 87 °F). A system designed with cooler water for the condenser allows steam to condense at a lower pressure so more power can be generated and less fuel is needed per unit of power produced. On the other hand, the larger the flow, the greater the costs of pumping power. Similarly, the costs for piping, valves, and the cooling towers rise with increasing flow rates. The greater the cooling offered by a tower (the smaller the approach, that is, outlet temperature at 85 °F versus 87 °F), the more it costs and, with mechanical draft towers, the more fan power is required. Thus, the choice of the most economical closed-cycle cooling system is a trade-off of lost capability from the generator versus increased capital and operating costs for the cooling system.

The optimization process requires developing estimates of the costs of the system, the power consumed by the pumps and fans, the operation and maintenance costs for the system, and the value of the lost capacity and power generation resulting from the closed-cycle system for a reasonable range of flow rates and condenser inlet temperatures. Stone and Webster has not submitted any information indicating that this type of analysis has been performed.

EPA also notes that the number of cells (and costs) for Unit 3 could be further reduced by adopting the enhanced multi-mode tower design parameters into the design of the closed-cycle Unit 3 design (decrease the flow and increase the hot water inlet temperature). In Stone and Webster's design, the enhanced multi-mode is designed to handle all the heat from Unit 3 using two fewer cells than the Unit 3 closed-cycle design.

Based on the above, EPA has concluded that Stone and Webster's design for the entire station closed-cycle alternative appears to unreasonably overstate the size of the cooling towers needed to convert BPS to closed-cycle cooling. As a result, the company, through its consultants, has also overstated the cost of the cooling tower component in its line-by-line estimate. While EPA recognizes that the company's estimate is only a rough order of magnitude figure, its values in this regard seem unreasonably high. Nevertheless, in an effort to be conservative, EPA retained the company's cooling tower cost estimate in its line-by-line analysis.

Summary/Conclusions

EPA has carefully considered the costs of retrofitting BPS with mechanical draft cooling towers on all units. EPA used site-specific information submitted by the company as the basis for one capital cost estimate (the line-by-line method) and used another more generic, national methodology (with some adjustments to reflect site-specific considerations) to develop a second capital cost estimate (the § 316(b) method). The national costing approach corroborates the site-specific analysis. To be conservative and consistent with the Draft Permit, EPA is basing the cost of compliance on the higher of the two estimates (in this case, the site-specific line-by-line analysis). In some instances (for example, noise), EPA's analysis was more detailed than the permittee's. EPA then included its higher capital cost estimate in its overall long-term cost estimate, which included annual expenses, tax considerations, and other factors mentioned above.

From its analysis, and a careful consideration and review of the permittee's estimates, EPA believes that the company has likely overstated the costs of converting BPS to closed-cycle cooling. The company submitted preliminary design specifications with a margin of error of +/- 25 percent. The preliminary design does not appear to be optimized with respect to the number of cooling tower cells. The fact that the company now claims that the service water flow was not included in the design is a further indication that the design did not include other important considerations. In addition, the company submitted estimates of plume impacts that are inadequately justified and might be significantly overstated. The company's noise analysis was general in nature and also likely overstated the noise impacts. EPA expects that the firm selected by the permittee to develop the final design will significantly refine the company's preliminary design assumptions, resulting in lower costs to undertake the cooling system retrofit that constitutes BTA under CWA § 316(b).

EPA also believes the company has made little or no effort to take advantage of savings that could be realized by managing its construction projects in a coordinated manner (see SAIC trip report- Appendix U). While the company criticized EPA for including some estimated economies of scale in the Draft Permit analysis, the company does not yet appear to be attending to realizing economies of scale through management and coordination of its air pollution equipment installation, re-locating the switchyard, and converting the station to closed-cycle cooling. EPA expects, of course, that the permittee may make such efforts once it becomes clear what is necessary to comply with the new NPDES permit and the new air regulations.

Finally, EPA also notes here that the company appears to have erred in several respects in describing the enhanced multi-mode system. Specifically, the company has requested thermal permit limits well above what could be achieved by the EMM (28 TBtu/year versus about 22 TBtu/year). The company also appears to have made errors in its CALPUFF plume effects model (assuming full operation of EMM, counting background fog and the like; see MFG memo, Appendix M). Finally, regarding hours of operation, the company's approach is internally inconsistent. It requests permit limits that result from less than full operation of the EMM, yet it submitted vapor plume modeling results based on full operation.

62. Comment

Commenter 1186 stated that "EPA should have paid closer attention to the report by their own consultant. If they had, they would have seen in Table 5 of that report, that $68 million for the cooling tower design is not for a fiberglass cooling tower, [and] it is not for a cooling [tower] constructed for use in saltwater, as we have at Brayton Point. In fact, the cooling tower proposed is a pressure treated, redwood design for use in freshwater applications." regarding construction material for the towers, Commenter 1237 stated, "It needs to be fiberglass. A lot more money."

Response

EPA disagrees that it has made the errors suggested by the commenters. EPA notes that the capital cost estimate it used in its Draft Permit analysis was based on the cost of a fiberglass tower to function using salt water for an estimated cost of $93.8 million. The $93.8 million capital cost figure was used in EPA's financial analysis, which considered other relevant cost factors such as construction downtime and outages, discount rate, efficiency losses, and avoided load loss, among others. The resulting total present-value of cost after tax was computed to be approximately $68 million for the Draft Permit.

63. Comment
One commenter (1034) stated that PG&E-NEG should not avoid antipollution improvements and that "the costs that they avoid get transferred to the citizens of Fall River" and that PG&E-NEG should "[p]roduce power in a manner that includes all of the costs of producing power." The same commenter noted that the "cost of generating electricity should be borne by the generator, not by residents of Fall River. Mount Hope Bay belongs to all citizens of the Commonwealth of Massachusetts and the State of Rhode Island. The bay is not PG&E's private pond to debase and destroy."

Response
The comment is noted. EPA agrees that the waters and fishery of Mount Hope Bay are public resources and that a public policy challenge is posed when harm to the public's environment from private business operations is not appropriately addressed. This is sometimes referred to as the problem of "uncompensated externalities."

64. Comment
A commenter (1146) noted that there are "tangible and intangible costs to generating power" and that "the associated intangible costs are also very real. These include the costs associated with the collapse of the fishing industry in Mount Hope Bay and the environmental damage that results from the discharge of almost a billion gallons of hot water per day into the Bay. The EPA's proposal will address these costs now before they become unmanageable."

Response
EPA agrees that power generation creates many intangible costs to the environment and that it should include these effects in its consideration of costs and benefits. EPA has tried to address this concern in its assessment of benefits from both nonmonetized and monetized perspectives. EPA's assessment of benefits and the application of the "wholly disproportionate cost" (to benefits) test is discussed in detail elsewhere in this response to comments, as well as in Chapter 7 of our July 22, 2002, Draft Permit Determinations Document. In addition, Congress recognized this problem when it enacted the CWA and this is reflected in the statute's environmental standards.

65. Comment
At least one commenter (1223) stated that, regarding the difference in EPA's and the company's cost estimates, "it really doesn't matter because despite the substantial difference in the cost estimates, both the company's and EPA's estimates reveal costs that are wholly disproportionate to the benefits when those benefits are rigorously evaluated."

Response
EPA disagrees that the costs to the company are wholly disproportionate to the benefits, even if the permittee's cost estimates are used. As explained elsewhere in this document, costs are only one part of the equation and benefits also need to be taken into account. EPA discusses its consideration of costs and benefits elsewhere in this response to comments.

Response # IV.66-85	**Document #**: 1004, 1130, 1132, 1133, 1150, 1156, 1164, 1165, 1168, 1177, 1184, 1195, 1203, 1208, 1223, 1227

Summary
EPA received a number of comments that have been classified as dealing with assessing the benefits of making cooling water intake structure improvements in the context of conducting economic analysis. These comments are addressed here. EPA also received comments, including some of the above-listed comments, that addressed other sorts of economic issues. These include, for example, comments

regarding possible effects on ratepayers of undertaking such improvements. Comments addressing these other types of economic issues are responded to in other sections of this document.

66. Comment

The Town of Somerset Board of Selectmen stated that, in its view, the costs to the permittee of complying with the limitations proposed in the Draft NPDES Permit would be "wholly disproportionate to the benefits" that would result. The Board noted that EPA had not "guaranteed" that the expenditures would result in recovery of the fishery. The Fall River Area Chamber of Commerce also stated that the cost to the permittee of installing cooling towers for all four generating units at BPS would be "in excess of [the] benefits to aquatic populations." (1004, 1168, 1156)

Response

As indicated in the Draft Permit materials and elsewhere in this document, EPA disagrees that the cost of complying with the Draft NPDES Permit would be wholly disproportionate to the benefits of such compliance.

First, it is important to remember that the "wholly disproportionate cost" test applies under CWA § 316(b), but does **not** apply to the other legal standards that provide the basis for the limitations in this permit. For example, costs and benefits are not required considerations in applying CWA § 316(a) on a case-by-case basis or developing limitations to comply with State water quality standards.

Second, the quantitative or qualitative considerations upon which the commenters base their conclusion regarding costs and benefits are unclear. EPA expects that the conclusion is derived from the cost and benefit assessment work conducted by the permittee. The Town refers, however, to cost estimates ranging from $300 million to "perhaps well over $500 million" and provides no basis or reference for these figures. The $300 million figure is larger, but not a great deal larger, than the permittee's highest estimate of approximately $275 million. The $500 million figure, however, is substantially larger than even the permittee's largest estimate. In any event, EPA believes these figures are substantial overestimates of the cost of complying with the permit. Moreover, even assuming the permittee's costs, EPA's analyses indicate that the costs are not wholly disproportionate to the benefits.

With respect to benefits, the Town makes no reference to any particular monetized benefits estimate. The Town's comments appear to suggest, however, that it is likely to have accepted the permittee's assessment despite the fact that the permittee did not provide its benefits analysis, at least to EPA, by the time of issuance of the Draft Permit. The Town does not expressly assess benefits from a qualitative perspective but appears to agree that restoring the fishery is an important goal. Yet the Town points out that EPA has not "guaranteed" that plant improvements necessary to comply with the permit will, in fact, bring about that recovery. EPA is not required to provide such a guarantee in setting permit limits, and it would be impossible to provide one. Nevertheless, EPA has explained why it has concluded that improvements at the plant, coupled with other steps under way (such as fishing restrictions and combined sewer overflow abatement), should lead to a recovery of the fishery. The Agency has also explained why it believes that lesser environmental improvements at the plant are likely to impede or prevent a recovery despite these other steps. But even apart from the issue of fishery recovery, it is clear that the power plant withdraws and kills trillions of organisms, including billions of fish eggs and larvae, and that the power plant's thermal discharge alters the habitat of the Mount Hope Bay estuary. It is equally clear that the permit limits proposed by EPA will achieve substantially greater reductions in these adverse environmental impacts than the permit limits proposed by the permittee (approximately 95 percent versus 33 percent). EPA has properly taken all of these considerations into account in its unmonetized assessment of the benefits of reduced environmental effects that would be effectuated by the permit. Moreover, EPA's monetary assessment of the benefits of compliance with the new permit is **not** based on any assessment of whether or not the fishery will recover as a result of the permit's requirements. It is simply based on the number of fish taken by the plant. These figures are soundly established and are, in fact, conservative estimates.

These analyses support EPA's permit. EPA has detailed its assessments of costs and benefits in the Draft Permit materials and elsewhere in these responses to public comments.

With respect to the comment that the cost to the permittee of installing cooling towers for all four generating units at BPS would be "in excess of [the] benefits to aquatic populations," EPA has several responses. First, the commenter appears to be proposing a strict cost-benefit test under which estimated costs may not be permitted to exceed estimated benefits. The CWA does not require such a test. As discussed in EPA's Draft Permit materials and elsewhere in this document, neither a precise nor a strict cost-benefit analysis is required. Under CWA § 316(b), costs and benefits are considered under the "wholly disproportionate cost" test, while under the BAT technology standard applicable to thermal discharges, costs only need to be "considered." Furthermore, costs and benefits are not required considerations in applying CWA § 316(a) on a case-by-case basis or in developing permit limitations to comply with State water quality standards. Second, EPA concludes that the cost of permit compliance will **not** exceed the benefits, when a reasonable qualitative and quantitative consideration of the benefits is properly taken into account. With respect to a solely monetary assessment of costs and benefits, EPA recognizes that all the estimates of costs and benefits are uncertain. EPA has, however, considered the costs and benefits from various perspectives and made adjustments to different variables. As a result, EPA have come up with a range of figures that provide reasonable estimates. Moreover, its monetized benefits estimates are conservative in many respects (e.g., they do not include benefits for habitat improvements from reduced thermal discharges). Since estimation of benefits is not required under the legal standards applicable to thermal discharges, EPA did not undertake the difficult exercise of developing a monetized estimate of the benefits of reduced thermal discharges. In the end, EPA reasonably concluded that the costs of complying with the new permit would not be wholly disproportionate to the benefits.

67. Comment

Save The Bay of Rhode Island commented that changing the power plant to closed-cycle cooling is a "widely available, economically achievable" technology and its costs would neither be "wholly disproportionate to its environmental benefits" nor passed through to electric consumers to a significant extent. (1133)

Response

EPA agrees with these comments and would add only that while cooling towers are clearly "widely available" for electric power plants, existing power plants have less commonly been retrofitted to closed-cycle cooling systems. That being said, EPA found a number of pertinent cases involving the retrofit of existing power plants from once-through cooling systems to closed-cycle cooling systems using cooling towers. EPA has also determined that at BPS in particular, a retrofit to closed-cycle cooling is both economically practicable and technologically feasible. Because of the substantial flow reductions allowed by closed-cycle cooling, along with associated reductions in adverse environmental impacts from entrainment and impingement, it is clear that this technological approach constitutes the BTA for application at BPS.

68. Comment

Save The Bay of Rhode Island stated that Congress did not want EPA to give costs and economics primary importance in applying CWA § 316(b) and that EPA is "barred [from] directly compar[ing] the costs and benefits of pollutant reduction in determining the BTA," as the permittee urges EPA to do. It also stated that under CWA § 316(b) EPA should focus on benefits and harms to the environment rather than the permittee's ability or inability to pay for pollution abatement measures. (1133)

Response

EPA agrees that Congress did not intend EPA to give costs and economics primary importance in determining permit limitations under CWA § 316(b). EPA also agrees that under CWA § 316(b), Congress intended the Agency to focus on environmental factors to determine permit limits that reflect the BTA for minimizing the adverse environmental impact from cooling water withdrawals. That being said, EPA has interpreted § 316(b) to require an evaluation of economic practicability in light of the statutory language referring to technological "availability" and a statement from the legislative history indicating that costs imposed under § 316(b) should not be impracticable. In the development of national, industry-wide standards, costs for a particular technology could be determined to be financially practicable for the industry as a whole even though some individual facilities might not be able to afford it. See, for example, *Environmental Protection Agency* v. *National Crushed Stone Association*, 449 U.S. 64, 81 (1980). In applying a technology standard on a site-specific, best professional judgment (BPJ) basis, however, EPA must look at financial practicability for the specific facility. In this case, the cost of complying with limits based on BTA are financially practicable for BPS.

The commenter also argued that EPA is "barred [from] directly compar[ing] the costs and benefits of pollutant reduction in determining the BTA." This comment refers to the application of CWA § 316(b), which is the source of the BTA standard. EPA does not agree with this comment. It is true that the language of CWA § 316(b) makes no mention of the consideration of costs or benefits, either individually or in comparison to each other. It is also true that this is distinct from how Congress has addressed the development of other technology-based standards, such as BPT and BAT standards. See 33 U.S.C. § 1314(b)(2)(A) and (B). Nevertheless, EPA has long taken the view that while Congress did not intend that a cost-benefit assessment be conducted to determine limitations under CWA § 316(b), or that a precise assessment of costs and benefits was necessary, Congress did intend that EPA could give "some consideration" to costs and that EPA would do this using a "wholly disproportionate cost test." See *In re Public Service Company of New Hampshire (Seabrook Station, Units 1 and 2)*, 10 ERC 1257, 1261 (NPDES Permit Application No. NH0020338, Case No. 76-7; June 17, 1977 [Decision of the Administrator]). This entails some comparison of costs against benefits. The First Circuit Court of Appeals in dictum in the case of *Seacoast Anti-Pollution League* v. *Costle*, 597 F.2d 306, 311 (1st Cir. 1979), stated that costs **could** be considered in setting limitations under CWA § 316(b) and noted EPA's wholly disproportionate cost test with approval. All of this is discussed in Chapter 7 of EPA's Draft Permit materials.

69. Comment

The Conservation Law Foundation of New England (CLF) commented that EPA correctly applied the "wholly disproportionate cost" test as part of its application of CWA § 316(b). CLF stated that the wholly disproportionate test under CWA § 316(b) requires only a general consideration of costs (citation: *Seabrook*, 10 Env. Rept. Cas. (BNA) at 1261), and that such consideration of costs is clearly secondary to the statutory mandate to require the "best technology available to minimize environmental costs." CLF noted that CWA § 316(b) makes no mention of cost considerations in setting BTA for cooling water intake structures, and that EPA made clear in the preamble to its 1976 regulations that no comparison of costs and social benefits was required (citation: 41 Fed. Reg. 17388). (As explained by EPA elsewhere, these regulations were later withdrawn following remand by the Federal court to EPA on procedural grounds unrelated to this issue.) CLF also stated that court decisions indicate that cost is a lesser consideration when applying a wholly disproportionate cost test (citations: *BASF*, 598 F.2d at 637; *Weyerhauser*, 590 F.2d at 1048). One of the reasons for this, as explained by CLF, is that Congress recognized the difficulty of precisely quantifying all the benefits from environmental improvements resulting from pollution control (citations: *American Petroleum*, 540 F.2d at 1038; *Appalachian Power*, 545 F.2d at 1361). CLF also stated that legislative history and court decisions reveal that Congress intended that the CWA force the implementation of new technologies on existing pollution sources in ways that might be expensive and difficult, that plant closures might result, and that Congress expressly rejected an economic hardship exemption as an "excuse" for continued pollution discharges. CLF further commented that Congress intended the CWA's technology-forcing mandate to have preeminent importance over economic considerations (citations: Legislative History of CWA of 1972 [Report on Economic Impact of CWA]; *Crushed Stone*, 449 U.S. at 79-81; *NRDC*, 822 F.2d at 123-24; and *Tanners' Council*, 540 F.2d at 1195). (1132)

Response

EPA generally agrees with these comments. The Agency notes, however, that Congress did consider economic concerns in enacting the CWA and various provisions of the statute mandate that EPA evaluate economic considerations in certain ways. EPA's analysis here is fully consistent with the directives of the statute.

70. Comment

A member of the Rhode Island Salt Water Anglers Association stated that the numbers of fish (e.g., flounder and tautog) that he had seen over his lifetime in Mount Hope Bay and Narragansett Bay no longer exist and that his children are missing out on the benefits of that abundance, and that EPA needs to take account of the benefits that our children and our children's children would receive from restoration of a healthy fishery. He commented that these benefits are not being counted when people put price tags on the benefits of the proposed cooling system improvements at the power plant. (1227)

Response

EPA agrees that the deterioration of the ecosystem and fishery of Mount Hope Bay is interfering with the public's enjoyment of the beneficial uses of natural resources that belong to the public and that have been designated to provide those benefits. The waters of the Mount Hope Bay estuary are supposed to provide good quality fish habitat and a fishing resource for the public. Instead, these waters have had to be closed to commercial and most recreational fishing. EPA agrees that these are important problems that should be addressed under the CWA. EPA has concluded that BPS operations have significantly contributed to these problems—along with other stressors—and that the new NPDES permit will reduce the negative impacts from the power plant. The improvements in BPS operations in conjunction with control of other stressors should lead to a recovery in fish stocks. EPA believes that public enjoyment of this resource can be restored to levels that were enjoyed in the past and that are supposed to be maintained. EPA has looked at **both** costs and benefits in determining the appropriate permit limits for BPS. Moreover, EPA's assessment of benefits tries to take into account the types of concerns raised by the commenter. See the July 2002 Permit Determinations Document, §7.6.

71. Comment

The Attorney General of Rhode Island commented that Mount Hope Bay provided important public benefits as an "important spawning and nursery area for millennia, and for the better part of the 20th century . . . as a valuable commercial and recreational fishery resource." He indicated that reducing the adverse environmental impacts of the BPS cooling system as proposed by the Draft NPDES Permit would benefit the State of Rhode Island's environment, commercial fishing, and recreational industries. (1150, 1208)

Response

EPA acknowledges these comments and has considered them in its assessment of the impacts of the facility and the benefits of controlling these impacts.

72. Comment

Save The Bay of Rhode Island commented that the thermal discharge and cooling water withdrawal reductions proposed by the Draft NPDES Permit would not only ensure the future of the plant and people's jobs, but would also ensure the health of the marine environment of Mount Hope Bay, providing substantial benefits to all who enjoy it and use it. (1177)

Response
EPA agrees that the power plant should be able to comply with the new permit and remain in business. EPA also agrees that, as a result, the permit should not result in job losses. Furthermore, some additional jobs might be created as a result of the construction of cooling system upgrades to comply with the new permit. EPA also agrees that compliance with the permit should help to restore and maintain the health of the Mount Hope Bay estuary and that this will provide substantial benefits to the public, some of which can be estimated in monetary terms and some of which can be assessed only in nonmonetary or qualitative terms.

73. Comment
Save The Bay of Rhode Island made a number of comments regarding the public benefits that would be provided by a healthy Mount Hope Bay ecosystem. Save The Bay stated that Mount Hope Bay is one of the most important recreational and cultural resources in the region. It also stated that the bay is an anomalous, unique ecosystem compared to other hydrologically similar embayments in the region, or to Narragansett Bay, because its temperatures, temperature patterns, circulation, flow dynamics, and marine species assemblages and distribution are unique and unusual. It commented that Mount Hope Bay was historically a biologically significant nursery area for many species of fish in Narragansett Bay and Rhode Island Sound, and that it once supported a thriving commercial fishery. In addition, Save The Bay stated that Mount Hope Bay was once one of the most productive estuaries in the Northeast and a main breeding ground for commercial species of fish for Narragansett Bay. It stated that it is difficult to estimate the value of the fishery that once existed, but anecdotal evidence suggests that these waters might have been used by dozens of vessels on a regular basis for generations. Save The Bay commented that Mount Hope Bay's importance as a natural resource is indicated by its designation as essential fish habitat (EFH) for species such as winter flounder under Federal fishery conservation laws, and by the fact that both Rhode Island and Massachusetts classify the bay's waters as either "SA" or "SB," the two highest classifications under State water quality standards. Save The Bay pointed out that these classifications indicate that the waters are supposed to be suitable for high quality fish and wildlife habitat, fishing, recreation, swimming, and shellfish harvesting, but stated that these classifications are not being attained because of the adverse impacts of the power plant (as well as other sources of degradation which are being addressed by the public). Save The Bay further commented that although Mount Hope Bay continues to support limited recreational fishing and direct-contact recreation—such as sailing, power boating, water-skiing, and shellfishing—there is now almost no commercial fishing and only very limited recreational fishing for winter flounder around the deep areas near Mount Hope Bridge. It stated that while low winter flounder populations led to strict State fishing restrictions, commercial vessels had already ceased to fish Mount Hope Bay during the 1980s, as it became economically infeasible because of diminished fish populations. Finally, Save The Bay also commented that while waterfront property values have tripled in Rhode Island in the last 5 years, most of the shorefront land around Mount Hope Bay remains undeveloped. (1133)

Response
EPA agrees that Mount Hope Bay is an unique ecosystem. Geologically, it is a large shallow water body with constricted connections to the larger Narragansett Bay. Hydrologically, it receives freshwater from 4 different river systems making it truly an estuarine environment. This estuarine nature and shallow depth make it an attractive spawning and nursery habitat for numerous species. Additionally, the constricted points of water exchange may result in greater retention of larvae spawned in Mount Hope Bay. No other part of Narragansett Bay has a similar combination of characteristics.

EPA agrees that the permit should provide significant public benefits. The Mount Hope Bay estuarine ecosystem is an important public natural resource. Indeed, it is an important part of the larger Narragansett Bay estuary, a designated estuary of national significance under the CWA's National Estuary Program. The shallow, protected waters of the Mount Hope Bay estuary should provide high quality habitat, including nursery and spawning areas, for many important species of fish, such as winter flounder, tautog, striped bass, and others. As the commenter notes, both the Massachusetts and Rhode Island portions of Mount Hope Bay have been designated as SA and SB waters (the two highest classifications) and are designated by the States to provide high quality fish habitat and a resource for fishing. Consistent with other comments and information in the record, the commenter points out that these waters once provided a fruitful commercial and recreational fishing resource, but that commercial fishing ceased during the 1980s and recreational fishing has had to be drastically restricted, because of diminished fish populations.

EPA agrees with the commenter that applicable State water quality classifications/designations are not presently being attained because of the deterioration of the fishery, the adverse alteration of the habitat, and the fact that stringent fishing restrictions have had to be imposed. EPA believes that operation of BPS's cooling system has contributed to these problems. Overfishing and other problems have also likely contributed to these problems. EPA agrees with the commenter that the proposed permit conditions will help to restore the quality of the fish habitat and the fishery. Other steps are also being taken that will contribute to this restoration. These include improved water pollution controls (e.g., Fall River CSO abatement) and fishing restrictions. While the permit's thermal discharge and cooling water withdrawals limits are based on the standards of CWA § 316(a) and § 316(b), respectively, EPA believes that these steps will ultimately help enable the fishery to recover so that fishing restrictions can be relaxed within an overall context of continued, careful management, and the designated uses for Mount Hope Bay can be attained.

In other words, although the thermal discharge conditions in the permit are based on CWA § 316(a), rather than State water quality standards, EPA concludes that the thermal discharge requirements will, in fact, help to achieve the water quality classifications, designated uses, and narrative criteria of the States' standards. This is not surprising since the States' standards are generally consistent with the standards of CWA § 316(a). In addition, EPA concludes that the permit's cooling water intake conditions, which were developed under CWA § 316(b), will also satisfy State water quality standards, and that these permit conditions cannot be made significantly less stringent without violating these State standards. EPA's analysis regarding the application of State water quality standards in the development of this permit is discussed in Chapter 5 and § 7.2.9 of the Draft Permit materials, and elsewhere in this document.

EPA has also noted that the waters of Mount Hope Bay have been designated as EFH for winter flounder by the National Marine Fisheries Service (NMFS) under the Magnuson-Stevens Fisheries Conservation and Management Act. EPA has, therefore, consulted with NMFS regarding this permit. NMFS indicated its concern about the protection of this habitat and its support for the conditions of the Draft Permit. NMFS further indicated that as long as the Final Permit is not made less stringent, it would recommend no **additional** conservation conditions for the permit. EPA has not made the permit less stringent in any significant way.

74. Comment

The Conservation Law Foundation of New England (CLF) commented that the public would substantially benefit from the recovery of the Mount Hope Bay ecosystem that would result from the proposed improvements at BPS, in conjunction with other environmental improvements that are in place or under way. CLF stated that Mount Hope Bay has the potential to be an important fishery and ecological resource. CLF noted that the bay's waters are designated as EFH for various species under Federal fishery conservation laws and that the bay is part of the larger Narragansett Bay estuary, a

Federally designated estuary of national environmental significance. CLF also noted that significant public investments have been made or are being made to improve the environment in the area, such as the City of Fall River's $150 million CSO abatement program designed to contribute to the attainment of water quality standards. CLF stated that the City, in light of its own investment, has called for BPS to meet the requirements of the proposed NPDES permit. CLF also noted that Massachusetts owns tidal salt marsh land in the area of BPS. In addition, CLF stated that fishing restrictions have been imposed by the States in an effort to help recover the fishery as the degradation of Mount Hope Bay, including by BPS, has coincided with fishery declines. CLF further stated that the permittee itself estimated that entrainment and impingement losses at BPS constitute almost 2 percent of the Rhode Island commercial winter flounder catch alone. CLF then commented that this loss is economically significant given the "role of fishing as an economic driver in Rhode Island." CLF stated that in 2001, Rhode Island commercial fishing yielded 4,687 jobs and generated $758 million in direct sales, which in turn generated a total economic impact of approximately $1.7 billion for the Rhode Island economy. CLF then stated that it is time for the permittee to make the improvements at BPS that are called for by the Draft NPDES Permit given the public investments in the ecological recovery of Mount Hope Bay and the serious harms to the public from the power plant's cooling system. (1132)

Response

EPA agrees that substantial public benefits would result from the recovery of the Mount Hope Bay ecosystem. EPA has also concluded that the reduced environmental impacts required by the new NPDES permit for BPS will, in conjunction with other environmental improvements that are in place or under way, be essential to achieving that recovery. EPA has discussed the points raised by the commenter in § 7.6.3a of the Draft Permit materials and elsewhere in this document and its analysis is essentially consistent with the comment. EPA has considered the comments by the City of Fall River, which support the conditions of the Draft Permit, as alluded to by the commenter. EPA has also considered the major expenditures being undertaken by the City to reduce its pollutant discharges to Mount Hope Bay in order to comply with applicable water quality standards, as is discussed in the Draft Permit materials and elsewhere in this document. EPA is also aware that the commenter (i.e., CLF) has invested considerable effort on its own part to bring an enforcement case, which was settled with the City, to ensure that the City of Fall River takes necessary actions to abate CSOs in order to comply with State water quality standards and to restore/protect water quality in Mount Hope Bay. EPA has issued administrative orders to the City in the past to ensure that Fall River's public sewage treatment plant would meet all applicable CWA standards in order to protect the Mount Hope Bay estuary, and the City has made required improvements to the treatment plant. Finally, improvements to the power plant's cooling system that result in markedly reduced entrainment of fish eggs and larvae should be beneficial to the biological productivity of the publicly owned salt marsh habitats.

EPA acknowledges the commenter's statements regarding the importance of commercial fishing to the Rhode Island economy and adverse impact of BPS entrainment and impingement on the fishing industry. The economic loss in the commercial fishing industry resulting from BPS entrainment and impingement is accounted for as part of EPA's benefit analyses. However, our analysis is narrow in the sense that it fails to quantify the broader impact of the economics losses in the commercial fishing industry on general employment and income in Rhode Island, which would include the economic multiplier effects from the impacts in the commercial fishing industry. EPA generally agrees with the commenter's points and believes they add further justification for undertaking the technology improvements required by the Final Permit.

75. Comment

Save The Bay stated that while it is very difficult to fully define the value of the resources adversely affected by the power plant's cooling system, both RI DEM and EPA have tried to do so in different ways. It further commented that despite the inadequately low benefits assessments developed by all the parties here, even conservative estimates of natural resources damages by the power plant rise to “the double digit millions” of dollars. (1133)

Response

EPA agrees that (a) it is very difficult to fully define in monetary terms the value of the resources adversely affected by the power plant’s cooling system, and (b) even conservative, incomplete efforts to monetize the benefit (or value) of the natural resources that would be preserved/protected as a result of meeting the requirements of the new permit rise to “the double digit millions of dollars” annually. In light of the impossibility of fully monetizing all the benefits of preserving these natural resources, EPA has also properly undertaken nonmonetary and “qualitative” considerations of these benefits. Moreover, in light of the unavoidable imperfection of, and uncertainty about, the various estimates of costs and benefits, EPA has considered the results from multiple methods of estimation. EPA’s assessments of benefits and costs are set forth and discussed in detail in the Draft Permit materials and elsewhere in this document.

EPA also wishes to underscore here that (a) cost-benefit comparisons do not enter into permit determinations regarding limits needed to comply with CWA § 316(a) or State water quality standards, (b) costs only need be “considered” in developing BAT discharge limits, and (c) a “wholly disproportionate cost” (to benefits) test is used when applying CWA § 316(b). Neither a precise quantification of costs and benefits nor a strict cost-benefit analysis is required in applying any of these standards.

76. Comment

Save The Bay stated that, to date, all parties’ assessments of the “benefits” of reduced cooling water intake are “incomplete” and “underestimate the impacts on the Mount Hope Bay estuary as well as [the] indirect economic and use values” that would be achieved by making the improvements proposed by the Draft Permit. Save The Bay further stated that the permittee grossly underestimated the negative impacts of BPS on the bay and, therefore, the benefits of reducing the plant’s cooling water withdrawals and thermal discharges. It also commented that the comparisons that have been done of the costs and benefits of actions needed to comply with the proposed permit limits are unfairly skewed against the permit because they have involved comparing the **complete** costs that would be incurred by the permittee if it installed closed-cycle cooling technology with an **incomplete** set of benefits. Save The Bay also stated that the benefits of these improvements have been calculated based on fish loss data collected by the permittee that focus only on a subset of species harmed by the plant’s impingement and entrainment and that this “grossly underestimates total losses.” It stated that invertebrates, such as lobsters, mussels, crabs, shrimp, or clams, are not considered despite their commercial value, just as forage species losses are not considered despite their importance and value. Save The Bay also commented that the economic analysis conducted by Mark Gibson of the RI DEM focused only on “ex-vessel” losses for a narrow subset of affected species. (1133)

Response

EPA agrees that all monetized estimates of the benefits of the reduced environmental impacts required by the permit are uncertain, incomplete, and (most likely) underestimates of the full, monetized value of these improvements. In light of these issues, EPA considered a variety of benefit estimates for the Draft Permit and also undertook nonmonetary and qualitative assessments of benefits. In the response to comments, EPA has also made some improvements to its benefits estimates for use in the development of the permit. These revised benefits estimates are presented and discussed elsewhere in this document. Of course, despite the improvements, the benefits estimates remain unavoidably incomplete and uncertain, and (most likely) underestimate the full value of the resources that would be preserved/protected by compliance with the permit. One of the reasons that the estimates are incomplete and most likely underestimate benefits is that EPA did not value the benefits of reduced thermal discharge, attributed no value to organisms other than fish, and did not capture the benefits of all the fish that will be restored to the ecosystem as a result of the permit. EPA's benefits analyses also contain many points of conservatism that should tend to prevent overestimation. In light of all this, EPA continues to assess multiple approaches to estimating monetized benefits as well as nonmonetary and qualitative assessments of benefits.

EPA agrees that the permittee has underestimated the negative impacts of BPS on the bay and that this has contributed to its underestimate of the benefits of reducing the plant's cooling water withdrawals and thermal discharges. EPA has discussed these negative impacts in the Draft Permit materials and elsewhere in this document, including responses to comments. Some additional points should also be noted in this regard. The permittee failed to provide any benefits analysis with its permit application. It presented only a bottom-line benefits figure, with no presentation concerning how that number was developed. In its comments on the Draft Permit, the permittee for the first time actually provided an estimate of benefits. EPA has reviewed this analysis and believes that it substantially underestimates benefits. The Agency notes that the permittee includes no non-use values for the resources that would be protected as a result of the permit and disagrees with EPA's assessment of such values. Furthermore, the permittee undertakes no qualitative consideration of benefits and provides little comment on the substance of EPA's qualitative assessment of benefits.

It should also be underscored that EPA's monetized benefits estimates are derived simply from the number of fish estimated to be lost to the power plant intake; they do not depend on any particular conclusion regarding the power plant's role in the collapse of the Mount Hope Bay fishery, or even that the fishery has collapsed. Thus, EPA's calculation of monetized benefits is not affected by disputes over these issues. Of course, estimates of how many fish the plant takes via the intake affect EPA's benefits estimates, and the permittee has questioned EPA's estimates of the number of fish taken. EPA has considered these comments and concluded that the estimates were reasonable, but that some revisions in response to these comments would also be reasonable and appropriate. The permittee's comments on those and other issues are addressed, and any revisions made have been explained elsewhere in this document.

EPA agrees that its monetized benefits estimates do not consider invertebrates but it has tried to consider forage species in its non-use value estimates. In addition, EPA's non-monetized benefits assessments try to take into account the full ecological benefits of converting BPS to closed-cycle cooling.

EPA agrees with the commenter that with respect to the costs and benefits the Agency has compared in applying the wholly disproportionate cost test, the cost estimates are more complete than the benefits estimates. Some of the considerations left out of the benefits estimates are detailed above, whereas the cost estimates do not appear to omit elements of similar significance. This should not affect the final permit determinations, however, because despite potentially underestimating the benefits, EPA has determined that the costs of complying with the permit are **not** wholly disproportionate to these benefits. The Agency also notes that, like the benefits figures, the cost figures, though more complete, are still just **estimates**. They are affected by predictions about many unknown factors and will not be perfectly accurate. Cost issues are discussed elsewhere in this document.

EPA has discussed Mark Gibson's economic analysis in the Draft Permit materials.

77. Comment

Save The Bay stated that the permittee's comparison of estimated fish losses at the plant to large regional fish stocks is inappropriate and misleadingly attempts to downplay the significance of those losses. It commented that one should, instead, compare the losses to populations in Mount Hope Bay specifically.

Save The Bay also stated that the permittee's proposed "Enhanced Multi-Mode" system would eliminate 70 percent of Mount Hope Bay's winter flounder population as well as a large percentage of other species, while "production foregone," including vertebrates and phytoplankton, would "greatly exceed" 54 million pounds per year. Save The Bay commented that these amounts exceed allowances given to fishing sectors despite the fact that the power plant would be "wasting" the organisms so that they would provide no value or benefit to people or the ecosystem. (1133)

Response

EPA has addressed these comments elsewhere in this document.

78. Comment

Save The Bay commented that even the Habitat Replacement Cost (HRC) figures developed by EPA underestimate the cost to the public of BPS's pollution and the benefits of ending that pollution. It also stated that regardless of the permittee's complaints about the HRC analysis, the HRC analysis actually attempts to quantify the environmental cost to the resources harmed by the power plant and that this is important because the plant causes direct and indirect adverse effects on users of the Mount Hope Bay estuary. (1133)

Response

EPA agrees that BPS's cooling system operations cause direct and indirect harm to the Mount Hope Bay estuary, to the habitat it provides, and to the public that owns and enjoys it. The HRC analysis is an attempt to estimate the cost that would be involved if the public tried to restore those natural resources with environmentally sound restoration measures. (Of course, the ultimate success of any such restoration measures would be uncertain, and it is preferable, where possible, to avoid such harms in the first place rather than to inflict them and then try to offset them with restoration programs of uncertain efficacy.)

79. Comment

The CLF commented that EPA appropriately assessed the environmental benefits of closed-cycle cooling by considering three different methods of analysis (i.e., referred to as the "benefits transfer" analysis, the "per-person recreational and non-use value" analysis, and the HRC analysis), and by conducting a qualitative assessment of the benefits. CLF states that the so-called "benefits transfer" (BT) method that EPA used grossly underestimates the full ecosystem benefits of conversion to closed-cycle cooling for all four units because, among other things, it focuses on landed fish only and fails to capture the "ecological value of billions of fish and invertebrates that serve as essential components of the aquatic food web" but may have no direct commercial/recreational value. CLF states that the so-called "per-person analysis" applies "more credible empirically-based adjustment factors to recreational use values across an appropriate population, and more fully captures non-use values associated with closed-cycle cooling." CLF also states that the so-called HRC analysis also appropriately provides relevant information for consideration. Recognizing that the HRC analysis provides restoration costs, rather than "benefits" from a willingness to pay measurement, CLF comments that the HRC results are still relevant, useful, and appropriate for consideration in evaluating benefits in light of the absence of readily available, accurate benefit valuation techniques for the full range of values of an aquatic ecosystem, especially those ecosystem function values not derivable from marketplaces (i.e., "non-market goods"). In this regard, CLF also reiterates that CWA § 316(b) does not require a strict cost-benefit analysis and that costs only need to be "considered" in a general sense. CLF also notes that the HRC method is derived from replacement cost methods consistently upheld by courts in natural resources damages cases. CLF notes that EPA's analyses demonstrate that the costs of installing closed-cycle cooling for all four generating units at the plant are not wholly disproportionate to the benefits of doing so. (1132)

Response

EPA agrees with the commenter that EPA's analyses demonstrate that the costs of complying with the permit's cooling water intake limitations by installing closed-cycle cooling for all four generating units at BPS are not wholly disproportionate to the benefits of doing so. EPA also agrees that CWA § 316(b) does not require a strict cost-benefit analysis or that costs and/or benefits be estimated precisely. CWA § 316(b) requires only that costs and benefits be "considered" in a general sense to ensure that costs are not impracticable and that the costs of compliance are not wholly disproportionate to the benefits. EPA has gone far beyond the minimum requirements in its consideration of costs and benefits.

With respect to the comments addressing specific benefits analyses by EPA, the Agency offers the following responses. EPA agrees that the BT analysis discussed in the Draft Permit materials substantially underestimates the full benefits that would result from compliance with the limits proposed in the Draft Permit. EPA discussed this analysis in § 7.6.3b of the Draft Permit materials. EPA also agrees that the "per-person analysis" produces a more "credible" assessment of values, including non-use values which ought to be considered and assessed. While believing this analysis provides a reasonable, appropriate assessment, EPA has made some improvements to it in response to comments received on the Draft Permit. EPA also agrees that the HRC results are helpful to consider in evaluating benefits as long as it is understood what the figures do and do not represent so that their relevance is appropriately delineated. EPA properly considered the HRC figures in the Draft Permit materials. See July 2002 Permit Determinations Document, § 7.6.3b(iii). In response to comments, however, EPA has also produced a revised analysis converting the HRC results to willingness to pay measures. EPA's revised analyses, prepared in response to comments, are presented and discussed elsewhere in this document.

EPA also agrees with the commenter that techniques for **fully** valuing the complete range of values of an aquatic ecosystem do not exist, and that this problem is especially acute for ecosystem function values not derivable from marketplaces (i.e., "non-market goods"). With respect to the comment concerning the "ready availability" of methods of valuation, EPA agrees that some methods are likely to be too expensive and time-consuming to be relied upon in an individual permitting context owing to the nature of the processes involved and the special expertise needed to undertake them. For example, EPA has determined it would be too costly and time-consuming to conduct a site-specific contingent valuation study of relevant non-use values to support the development of the BPS permit. Nevertheless, EPA determined that it could undertake appropriate "benefits transfer"[27] analyses to assess non-use values in a more cost- and time-efficient manner. This might not, however, be possible for every permit because of budget and time constraints. It also might not be needed or appropriate owing to the issues and data constraints presented by individual cases. EPA's analyses in this regard include, as mentioned above, the per person analysis and the HRC analysis, as revised. Of course, as discussed elsewhere, these benefits transfer analyses are still incomplete in various ways. In response to all these issues, EPA also conducted an appropriate quantitative and qualitative nonmonetized assessment of the value of the resources at issue.

80. Comment

One commenter stated that cost-benefit analysis should not be regarded as providing the sole basis for determining the conditions to be included in the BPS NPDES permit or other regulatory decisions. This commenter noted that the permittee's economic consultant, Robert Stavins, had actually made this point himself in a 1984 paper. The commenter quoted with approval the following language from this paper:

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[27] Please note that we use the term "benefits transfer" in its generic sense here, as opposed to its earlier use to refer to a specific analysis of commercial and recreational fishing values that was conducted for the Draft Permit. See Economic Guidelines, p. 59. In retrospect, it would have been preferable to give that earlier analysis a different label to avoid any confusion.

> [t]here are numerous limitations to benefit-cost analysis as an aid in decision-making, and those limitations indicate that the benefit-cost criterion ought not to be used as either a necessary or a sufficient criterion for project investment. Public-policy decisions regarding the use of the nation's scarce natural resources are ultimately political decisions, and should remain so.

This commenter also cited with approval additional criticisms of cost-benefit analysis made by Stavins in this paper to the effect that conventional cost-benefit analysis might exclude relevant externalities, discounting calculations might lead to ignoring future consequences, and considerations of equity are often omitted from consideration. The commenter further stated that economic theory and legal precedent demonstrate that important benefits need not, and cannot always, be monetized, and that this is another reason why decisions cannot always rest solely on quantitative cost-benefit analysis.

Response
EPA believes that in developing a CWA permit, it should consider costs and benefits in a manner consistent with applicable statutes, regulations, and Agency policy. EPA believes that its analyses of costs and benefits for the BPS permit are consistent with the applicable legal requirements. Indeed, it has gone beyond the minimum legal requirements to consider costs and benefits, but has considered them in the appropriate context and given them appropriate weight in its evaluation. EPA also agrees that in the context of developing this CWA permit, all important benefits cannot be fully monetized but should be considered in other, nonmonetary ways. Both Congress and the courts have recognized the inability to monetize the full benefits or values provided by ecological resources. The limitations inherent in quantitative monetary cost-benefit analyses support EPA's qualitative assessment of the benefits of permit compliance and the exercise of reasonable Agency discretion in making determinations under CWA § 316(b)'s wholly disproportionate cost test.

81. Comment
One commenter discussed at some length EPA's present inability to monetize all environmental benefits or harms and the significance that this has for cost-benefit analysis and the development of the NPDES permit for BPS. This commenter noted that economic theory and legal materials recognize that all important environmental benefits, such as the benefits of reduced harm to aquatic ecosystems, cannot always be monetized. The commenter stated that this poses a "fundamental dilemma" for the use of cost-benefit analysis as **the** determinative factor in making policy decisions. According to the commenter, this is because cost-benefit analysis is intended to weigh the relevant costs of a proposal against its benefits, and, to provide a "meaningful" and "accurate picture of net benefits to society," the calculation of costs and benefits must be "equally complete," but they rarely are. The commenter analogizes to a corporate balance sheet that would provide a distorted picture if it weighed **all** income against only **some** corporate expenses. The commenter states, however, that when environmental protection issues are being considered, comparisons of costs and benefits are likely to be biased against environmental protection because the monetized costs of preventing environmental harm are relatively complete while many categories of environmentally important benefits are not monetized. This is because the costs typically involve market expenditures for activities (construction, installation, and operation of equipment) that have well-defined, readily researched market prices. This also partly explains why, according to the commenter, economic theory and legal precedent indicate that environmental policy decisions cannot always rest solely on quantitative cost-benefit analysis and that all important benefits need not be monetized to be considered in decision making. (1130)

Response
EPA agrees that all important environmental benefits, such as the benefits of reduced harm to aquatic ecosystems, cannot always be monetized. EPA also agrees that this could provide a real problem for

NPDES permit decision-making if permit decisions were determined solely by monetized cost-benefit analysis. In accordance with the requirements of the CWA, EPA's permit determinations were not, however, driven solely by monetary cost-benefit analysis. As discussed in EPA's Draft Permit materials, and elsewhere in this document, EPA's thermal discharge determinations under CWA § 316(a) are not based on cost-benefit considerations. Similarly, any EPA determinations related to State water quality standards and the requirements of CWA §§ 301(b)(1)(C), 401(a)(1), 401(a)(2), and 401(d) were not based on cost-benefit considerations. EPA's determinations under CWA § 316(b) involved the application of the "wholly disproportionate cost test" and included quantitative and qualitative nonmonetized assessments of the benefits of compliance with proposed intake conditions.

In assessing costs and benefits, EPA also agrees that it might often be easier to develop monetary cost estimates than to develop monetary benefits estimates. This is so for the reasons noted by the commenter. It might also be so because permittees are likely to be more willing or able to develop estimates of the potential cost of complying with stringent permit requirements than they are to estimate the benefits of doing so. For example, in this case the permittee provided detailed cost estimates with its December 2001 CWA § 316(b) Demonstration, but did not provide any detailed benefits estimates. It is also important to remember, however, that not only do benefits figures often represent estimates, but cost figures often do as well. Certainly this was the case for the BPS permit analysis. This is not a problem as long as it is properly taken into account in reaching a final decision.

82. Comment

One commenter stated that with respect to the BPS NPDES permit, EPA has engaged in a comparison of "relatively complete costs and substantially incomplete benefits." The commenter further stated that EPA's analysis identifies "numerous categories of benefits of reduced cooling water intake that have not been monetized," and that although "[i]t would be impossible in practice to estimate all of the omitted values," some benefits analyses have estimated broader sets of values than those considered by EPA for this permit (or in developing national regulations under CWA § 316(b)). The commenter pointed out that EPA's "benefits transfer" estimate for recreational value includes "only losses in recreational fishing," whereas EPA benefits analyses for the metal products and machinery regulations estimated separate recreational benefits for "fishing, other boating, wildlife watching and other near water activities." In addition, the commenter stated that recreational fishing provided only 25 percent of the total recreational benefits and that peer review has since resulted in even higher estimates for recreational benefits. The commenter then stated that these data suggest that if similar relationships held for cooling water intake reductions, then recreational benefits would need to be multiplied by a factor of four or more to reflect total recreational benefits, though the data to determine the magnitude of other recreational benefits are not presented by EPA for cooling water intakes. The commenter also stated that EPA's benefits analysis is incomplete because it values only a fraction of the commercially and recreational valuable species affected by the power plant. Specifically, the commenter stated that EPA counts only the fraction of fish that would have been caught by fishermen in the absence of impingement and entrainment mortality, thus ignoring all the ones that would "get away" based on historical catch rates. Given "catch rates" estimated at 12 percent for impinged fish and 7 percent for entrained fish, the commenter stated that "the great majority of the most valuable species" are not valued despite the fact that the "nonlanded fraction" have "obvious ecological value." As an example, the commenter states that these fish are the source of fish caught in future years (i.e., the source of future recreational/commercial value). The commenter stated that existing data do not allow calculation of the present value of the future reproduction of nonlanded fish but that a reasonable estimate would be that they are worth more than zero but less than the landed fish. The commenter then provides a calculation based on the "conservative" assumption that the nonlanded fish are worth 25 percent of the landed fish and concludes that using this value would almost triple the value of impingement losses (34 percent versus 12 percent) and more than quadruple the value of entrainment losses (30 percent versus 7 percent). (1130)

Response

EPA concedes that its benefits analysis looks only at fishing benefits. While it might have been possible to develop benefits estimates for other recreational uses of the affected resources that might benefit from the environmental improvements required by the permit, given the data limitations EPA believes that focusing on fishing effects was reasonable. Clearly, the fishing-related (use and non-use) benefits are the most directly related to the permit conditions in question. EPA also recognizes that most of the fish entrained or impinged were left out of the commercial and recreational use value analyses. However, EPA did evaluate, albeit conservatively, the non-use values of the unlanded fish. EPA also qualitatively assessed the benefits of permit compliance. The Agency believes its analyses were conservative (i.e., tend to produce low estimates) but not unreasonable based on the information available to it. The commenter's points regarding relatively small changes to EPA's analysis that would yield much higher values tend to confirm the conservativeness of the Agency's analyses. In the end, even if the analyses were **too** conservative and significantly understated the values of permit compliance, it is of no import because EPA found that the cost of complying with permit conditions that reflect the BTA for minimizing adverse environmental impacts would not be wholly disproportionate to their benefits.

83. Comment

One commenter stated that monetizing non-use values is critical to any attempt to place a monetary value on the benefit of preserving environmental resources and for any use of cost-benefit analysis to guide environmental protection decisions. He also noted that non-use values are recognized by both court decisions and economic theorists. This commenter further stated that one cannot capture the true, full public willingness to pay for environmental services by monetizing benefits unless non-use values are included. The commenter then stated that while "in theory" it might be preferable to calculate non-use values by performing contingent valuation studies asking the relevant population about their willingness to pay for protection of certain natural resources, such studies require substantial time and expense and often cannot be carried out. As a result, the commenter continued, analysts often face the problem of estimating non-use values without a new study specific to their situation.

This commenter noted that EPA faced this type of problem in developing the Draft NPDES Permit for BPS and praised the work that EPA and its consultant Abt Associates did to address it. He noted that EPA and Abt Associates "faithfully followed a classic model for [conducting] such [an] analysis" as was presented in a study issued by the Environmental Defense Fund (EDF) concerning the costs and benefits of a proposed hydroelectric development on the Tuolumne River in California. The commenter noted that the principal author of this EDF paper was Robert Stavins, currently an economic consultant hired by the permittee. The commenter stated that the EDF paper noted many environmental impacts that should be recognized in a qualitative sense but which could not be monetized. The commenter further stated that the monetization of non-use values was the key factor that resulted in the EDF paper's cost-benefit analysis favoring a decision to leave the resource in its natural state. The commenter explained that because the EDF analysts had no site-specific non-use values for the Tuolumne River, they extrapolated from published studies, using literature values to develop a ratio of non-user to user value. The commenter further explained that the EDF analysis estimated the local (California) population interested in the resource based on in-state Sierra Club membership, estimated the out-of-state interested population based on Sierra Club membership outside of California, and estimated a lower ratio of non-use to use values for the non-California members and applied that ratio to only 50 percent of those non-California members. With respect to the acceptance of this methodology, the commenter noted that this EDF analysis has been "widely circulated," is used as a "case study" in a graduate school program, and is still in use in the curriculum of economics departments at a number of universities around the country. The commenter stated that the analysis prepared by Abt Associates for EPA substantially tracks the methodology from the EDF paper on the Tuolumne and provides a reasonable estimate of the monetary value of non-use benefits from at least some of the environmental improvements to be provided by BPS's compliance with the limits proposed in the Draft NPDES Permit. The commenter points out that, as with the Tuolumne analysis, for Mount Hope Bay the non-use values account for most of the recreational value of the site and the results are large enough so that a cost-benefit analysis favors the pollution control proposed by the permit.

The commenter further notes with approval that Abt Associates also performed a "reasonableness analysis" as a check on the first analysis (using households within certain distances from Narragansett Bay rather than environmental group memberships) and that its results further supported the conclusion that substantial non-use values justify the proposed pollution controls. (1130)

Response

EPA agrees with the comments concerning the significance of non-use values in assessing the full value of environmental improvements.[28] Obviously, to the extent possible, such non-use values should be quantified when one is undertaking a monetary cost-benefit assessment. In light of the impossibility of fully quantifying such benefits, however, it is also appropriate to consider benefits qualitatively. EPA also agrees that site-specific contingent valuation studies are one method of assessing non-use values for a particular action but that this approach can be costly and time-consuming and cannot always be undertaken by permitting agencies.[29] EPA determined that such an approach would be infeasible and was not necessary for developing the BPS permit and is presently unaware of any other specific CWA § 316(b) permit action in support of which EPA undertook such an analysis.

In the absence of a site-specific study, EPA believes it is appropriate to undertake "benefits transfer" analyses,[30] and EPA undertook multiple such analyses (e.g., the "per-person analysis," the related "meta-analysis") and considered all the results obtained. EPA believes the methods it has used to support development of the Draft Permit were reasonable and appropriate. It has also made certain improvements to its benefits transfer analysis in response to comments (see, e.g., meta-analysis). The revised analyses are presented and discussed elsewhere in this document. EPA acknowledges the comments regarding the reasonableness of its "per person" non-use benefits analysis that was related to the approach taken in the EDF-Tuolumne River economic analysis. EPA feels that these comments bolster the reasonableness of the approach taken. EPA also, of course, acknowledges the permittee's argument that the Agency's analysis is unsound. The company hired the "principal author" of the EDF analysis, Robert Stavins, who now critiques his earlier work and argues that it used an unaccepted methodology. EPA continues to believe, however, that the analysis is reasonable and proper for consideration, although it is certainly imperfect. It also notes the comments above indicating that the "EDF analysis has been 'widely circulated,' is used as a 'case study' in a graduate school program, and is still in use in the curriculum of economics departments at a number of universities around the country." EPA also notes that the Preface to the EDF paper states that it uses "widely accepted economic methodologies." In any event, using this "per person" analysis as its starting point, EPA has made a number of revisions in response to comments from Stavins to produce its meta-analysis. These revised analyses continue to support the Final Permit conditions and are discussed in detail elsewhere in these responses to comments.

84. Comment

One commenter stated that many environmental benefits cannot be monetized and yet can, and should, be considered in a qualitative sense in making public policy decisions. (1130)

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[28] See Economic Guidelines at pp. 67, 69–71.

[29] See Economic Guidelines at p. 59.

[30] See *Id.*

Response
EPA agrees with this comment, and the Agency has indeed undertaken a qualitative assessment of the benefits of permit compliance.[31]

85. Comment
One commenter stated that none of the results of the various economic analyses of benefits should be regarded as decisive by themselves. He stated that the exact amounts are uncertain and many important benefits are “fundamentally unmonetizable” and, therefore, are left out of the monetized values, resulting in underestimates. He further stated, however, that despite these issues, the reasonable benefits estimates developed by EPA, in addition to those prepared by the commenter himself, yield potentially very large benefit levels that are comparable to, or larger than, the estimates of the cost of installing technology to comply with the conditions of the Draft NPDES Permit. The commenter stated that decisions about use of the nation’s scarce natural resources are ultimately political decisions and cost-benefit analyses should not, in any event, provide the sole basis for making either the BPS permit decision, or other regulatory decisions. This commenter further stated that the uncertainty of the benefits calculations and the range of plausible values shows “there is no single perfect methodology” and that it was appropriate for EPA to consider multiple methods as well as qualitative judgments. He noted that there are a range of opinions among individual economists regarding the merits of various methods and these opinions might change over time. He concluded that EPA “has made a thoughtful decision in this case, protecting an important public interest at reasonable cost to society; there is nothing in ‘economic science’ that proves their decision was wrong.” (1130)

Response
EPA agrees with these comments as they relate to its permit decision.[32]

Response # IV.86	**Document #’s**: 1121

Comment
One commenter show strong support for the Draft Permit and attached his article, published in the September 19, 2002, issue of the *Sakonnet Times*. The article describes the station’s destructive effects on marine life and asks that the station comply with § 316(b) of the CWA by installing closed-cycle cooling.

Response
This comment and the newspaper article have been reviewed and considered. EPA’s CWA § 316(b)-based permit limits are consistent with the comment.

Response # IV.87	**Document #’s**: 1131

Comment
Another commenter discusses the many stressors on Mount Hope Bay and while supporting EPA in requiring the Station to reduce water withdrawal and thermal loading, the commenter also believes that it is unreasonable to require that the entire plant be converted to closed-cycle cooling.

[31] See Economic Guidelines at pp. 59, 64, 66, 175–78.

[32] See Economic Guidelines at p. 178.

Response
EPA has considered the other possible stressors on aquatic life in Mount Hope Bay. We do not believe that the existence of these other stressors means that Brayton Point Station should not be required to reduce its own impacts on the bay in compliance with the Clean Water Act. Furthermore, other entities have taken steps to address the other significant stressors on Mount Hope Bay. Commercial and recreational fishermen have already been required to make significant sacrifices in an attempt to allow winter flounder stocks to recover. Proposed future restrictions will require fishermen to significantly reduce their catches even further. The City of Fall River is being required to upgrade its sewage treatment and increase its control of combined sewer overflows at a cost of well over $115 million dollars. Of course, the steps taken by other parties do not by themselves indicate that BPS must undertake similar efforts. Rather, BPS must do what is required by the CWA. In this instance, the CWA requires that BPS make sufficient reductions in thermal discharge to assure the protection and propagation of the balanced, indigenous population of fish, shellfish and wildlife of Mount Hope Bay, and that it achieve cooling water intake capacity limits that reflect the Best Technology Available for minimizing adverse environmental impacts.

Response #'s: IV.88	**Document #'s**: 1152

Comment
The commenter requests that EPA consider including the following restrictions on the permit's allowance for 122 hours of once-through cooling operations:

"1) reduce the flow and thermal discharge rates to those specified in MOAII

2) limit its use to failure of the closed cycle cooling system and periods of excessive fogging or icing,

3) limit the number of consecutive blocks of time once-through cooling may be used and

4) prohibit its use during summer and biologically sensitive periods."

Response
EPA has considered the commenter's suggested additional permit limitations on the use of the 122 hours of once-through cooling and has adopted the following:

1) EPA will require that the facility report the use, and the reasons for, once-through cooling to EPA;

2) EPA has prohibited the use of once-through cooling during the winter flounder spawning season (February through May).

EPA has decided not to adopt the other suggestions. At this time, it is not possible for EPA to predict, and therefore quantify the biological impact of, the exact number of once-through hours that the company will use. EPA notes however, that the company has an upper limit which bounds the number of hours and, therefore, expects the company will use them conservatively (i.e., not all at once). EPA also notes that this issue may be revisited when the permit is renewed.

Response # IV.89	**Document #'s**: 1196, 1221

Comment
One commenter believes that the increase in cooling water use and the decrease in winter flounder populations are two isolated pieces of information and that they shouldn't be considered as a cause and effect relationship. The commenter indicates that stressor identification is important and lists several other potential stressors to Mount Hope Bay including low dissolved oxygen levels, chemical loadings,

temperature changes, physical injury or disease causing bacteria and viruses. Furthermore, she states that all these factors can be influenced by: fishing, predation, urban runoff, boating activity, wastewater treatment discharges, leaking septic systems or industrial discharges. She adds that all "pertinent data should be considered and weighed, and alternative conclusions should be scientifically assessed before being ruled out."

Response
EPA did consider alternative explanations for the decline of winter flounder in Mount Hope Bay, which is also discussed elsewhere in this response to comments document. EPA realizes that a correlation in time does not equal cause and effect, but no other potential cause has been identified that matches the timing, the magnitude and duration of this impact.

EPA also notes that the CWA does not require EPA to prove that any one party "caused" the decline. Rather, EPA is faced with drafting a permit that satisfies CWA § 316(a), § 316(b) and applicable water quality standards.

Response # IV.90	**Document #'s**: 1230

Comment
One commenter supports the draft permit and was disturbed that "entrainment and the resulting destruction of uncounted larvae and juvenile fish" had not yet been addressed at the public hearing. The commenter asks directly "What is the value of that lost resource?" because he had not heard any "testimony on those economics". The commenter cites both the scientific data and observations of commercial and recreational fisherman as documenting the decline in fish populations.

Response
EPA's permit dramatically reduces flow of cooling water from BPS, this will result in a corresponding decline in entrainment and impingement losses. EPA's analyses did quantify these losses and estimated the number of adult fish that would result from entrainment and impingement. EPA used a variety of methods to estimate the economic benefit of the entrainment and impingement losses. These are discussed in great detail elsewhere in this document.

Response #: IV.91	**Document #**:1003, 1004 1168, 1170

Comment
EPA received comments from four commenters regarding potential environmental/health side effects of using cooling towers at BPS. Potential side effects mentioned include higher relative humidity, mist containing salt, warm moist air containing pollutants, additional respiratory illnesses, growth of mold and algae, fogging and icing of nearby roadways, disposal of heat to the atmosphere (creating a "heat island over the area"), changes in weather patterns, contribution to global warming, addition of an unsightly industrial building, and noise pollution. (1003, 1004, 1168, and 1170).

Response
EPA has carefully considered the environmental impacts associated with cooling towers and has concluded that these impacts are either inherently minimal or can be minimized using existing available technologies. The discussion below presents some basic facts about cooling tower emissions and then individually addresses each of concerns raised in the comment above. Some of these comments are also addressed elsewhere in these responses to comments as well as in Chapters 7 and 4 of EPA's July 22, 2002, Permit Determinations Document.

Cooling towers emit two different forms of water: drift (also called mist) and vapor plume (also called the visible plume or condensation). An important distinction between drift and the visible plume is that for former contains the same chemicals and solids present in the circulating water, whereas the latter is pure water vapor (i.e., not containing any pollutants or salt).

Drift from cooling towers is not likely to have a significant adverse impact on the surrounding community for several reasons. First, drift falls mostly within the immediate vicinity of the towers. Second, the towers will need to be permitted using Best Available Control Technology (BACT) (see discussion of air pollution issues), which would most likely be highly efficient baffles called drift (or mist) eliminators. This technology would nearly eliminate the entrained water droplets (and salt) that would have been emitted into the atmosphere by the cooling tower. The permittee also notes it would use highly efficient drift eliminators. In addition, the distance to the nearest receptors would also minimize any impacts from particulate matter emissions. The Texas Natural Resource Conservation Commission's Guidelines for Cooling Towers indicate that:

> [t]he use of drift eliminators in the design of the cooling tower will also reduce the impact of particulate matter emissions. Normally particulate matter emissions . . . are a concern only when the cooling tower is located within 200 feet of an off-plant receptor.

The permittee indicates that it would locate any cooling towers in a north-central area of the site.[33] The nearest residences to this north-central area are approximately 1,900 feet to the east in Somerset and approximately 1,900 feet to the west across the Lee River in Gardners Neck in Swansea.[34] Finally, all air emissions must meet Prevention of Significant Deterioration (PSD) and BACT standards under the Clean Air Act (CAA). For further information, please see EPA's responses to air pollution comments.[35]

Vapor plumes emitted by cooling towers are also unlikely to have any significant effect on the areas more than 200 feet away from the plant because, depending on weather conditions, plumes generally disperse and mix with surrounding air masses before reaching the ground. A study recently completed for EPA's assessment of BPS explains the normal behavior of a vapor plume as follows:

> [a]s soon as it contacts the outside air the exhaust from the cooling tower will begin to cool and as it does, it's ability to hold water vapor is reduced, and virtually all cooling towers will be seen to have some condensed plume of water vapor at the exhaust. As the plume travels downwind it mixes with surrounding air and eventually comes to equilibrium with the surrounding air. If the surrounding air has a fog already, then the plume will contribute to that fog but will be virtually indistinguishable from the surrounding air. However, in most cases, there is no existing fog and as the plume comes to equilibrium with the surrounding air the plume re-evaporates and no condensed moisture is present. So in most cases, the plume condenses immediately after exiting the

[33] See December 2001 USGen NE 316(a) and (b) Demonstration, Vol. IV, App. H, Figures 3.3-1, 2.2-1; NEPCO January 15, 1998 NPDES Permit Application, Figure 1.

[34] See Figure 7.3-1, "Brayton Point, Somerset, MA, Distances from Proposed Cooling Towers to Sensitive Receptors (EPA, January 24, 2002).

[35] It is also worth noting that under current EPA regulations, the cooling towers would use a phosphate-based water treatment program. Phosphates are not hazardous air pollutants and are not known to cause adverse health effects. 40 CFR 63.4.

> cooling tower and then re-evaporates at some downwind point. Most of the time the condensed plumes remain aloft and evaporate before contacting the ground.[36]

The dispersion and mixing effects described could possibly have aesthetic or health-related implications, but while the plume might be visible close to the cooling tower exhaust point, it will not typically reach ground level. Additionally, the above-mentioned study[37] also explained:

> there are special types of cooling towers that offer plume mitigation. Essentially these towers include some dry cooling within the tower itself that heats the plume prior to exhaust. This additional heat boosts the plume height, raises the temperature of the plume so that the relative humidity falls below 100 percent and can minimize the length and width of the plume.

EPA also discussed this type of cooling tower (known as "hybrid" or "wet/dry" cooling towers) in Chapters 7 and 4 of its July 22, 2002, Permit Determinations Document. EPA has investigated this technology, and its cost, and believes it could be used at BPS if needed to alleviate any vapor plume-related concerns (whether related to aesthetic or traffic safety issues).

Another result of the vapor plume dispersing and mixing with surrounding air is that it will not result in net higher relative humidity observed in the air over the towns in the vicinity of the plant, and will not change local weather patterns. Therefore, associated health impacts such as increases in mold, moist air, asthma, and additional respiratory illnesses are also not expected to occur. It is also worth noting that air pollutant emissions from coal combustion, which many commenters expressed health concerns about, will also be reduced as a result of BPS's compliance with new Massachusetts air regulations.

Similarly, dispersion and mixing of air masses also mean that the proposed cooling towers will not "create a heat island over the area." Heat is rapidly dissipated in the vicinity of the power plant and no adverse environmental effects are expected. Furthermore, heat dissipated to the atmosphere from cooling towers is not considered a contributing factor to global warming.

Other health-related concerns have been expressed regarding whether there are possible illnesses associated with cooling tower emissions. Some potential adverse human health effects have been identified from exposure to microorganisms associated with certain types of cooling tower applications. These naturally occurring microorganisms include *Salmonella* sp., *Shigella* sp., *Pseudomonas aeruginosa*, and *Legionella* sp. The most common bacterial infection associated with cooling systems is Legionnaire's Disease (LD), but no documented outbreaks have been linked to cooling tower air emissions. LD is caused by the bacterium *Legionella pneumophila* and was first discovered in 1976 at the American Legion convention at the Bellevue-Stratford Hotel in Philadelphia. It affects up to 100,000 people per year in the United States.[38] Symptoms often resemble pneumonia and in some cases LD can be fatal. Fifty-four reported outbreaks of the disease throughout the world indicate, however, that the

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[36] Kirk, Winges, An Evaluation of Cooling Tower Plume Studies Done for the Brayton Point Generating Station, MFG, Inc., July 2003.

[37] Ib*Id.*

[38] Considerations to Prevent Growth and Spread of *Legionella* in HVAC Systems found at <www.facilitymanagement.com/articles/arthvac5.html>.

cause is almost exclusively from indoor heating, ventilation, and air-conditioning (HVAC) systems used by large building complexes such as hotels, hospitals, offices, and factories. Other reported cases were linked to sources such as commercial spa baths and humidifiers. EPA could not locate any documented cases of LD where the potential cause was a power plant cooling tower. This is not surprising because power plant cooling towers vent to the open atmosphere rather than affecting a building's internal air conditioning system. Furthermore, the energy generation industry maintains its heat transfer efficiency and reduces fuel consumption by the use of biocides in power plant heat exchangers, condensers, and cooling towers.

In addition, the proximity of most power plants to public receptors is usually more than 200 feet (which, as previously stated, is outside the average zone of impact for drift). Generally, to the extent that any risk of adverse health effects is posed, it is only to the workers who clean the towers and condensers, and "[o]ccupational health questions are currently resolved using proven industrial hygiene principles to minimize worker exposures to these organisms in mists of cooling towers."[39] Potential adverse health effects on the public from thermally enhanced microorganisms could possibly be an issue for plants that use cooling ponds, lakes, or canals and that discharge to small rivers, but this does not apply to the BPS scenario.

Furthermore, it should be understood that the drift eliminators to be used at BPS will reduce the escape of spray from the towers. Again, the mist should not be confused with the vapor plumes or evaporated water that are seen rising above the cooling towers. These plumes are recondensed water vapor and do not contain disease-causing bacteria. EPA concludes that no additional mitigation measures are expected to be warranted other than the application of accepted industrial hygiene procedures. As stated previously, cooling towers have been used at numerous power plants without health problems.

Regarding the traffic safety concerns expressed by the commenters, evidence from site-specific data as well as other plants indicates that the cooling tower vapor emissions are unlikely to cause significant increases in fog and ice. As indicated, typically a vapor plume will dissipate after traveling a short distance due to dispersion and evaporation.[40] The permittee's analysis estimated that in an average year, there are 343 hours of natural "background fog and ice" (336 hours of fog and 7 hours of ice) near the plant, and that the 20-cell cooling tower array would add 7 hours of "plume-induced fog and ice" (6 hours of fog and 1 hour of ice). This represents only a 2 percent increase over background conditions.[41] Moreover, based on an assessment of site-specific design considerations for cooling towers at BPS, EPA

[39] Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437 Vol. 1), 4.3.6 Human Health, U.S. Nuclear Regulatory Commission, May 1996.

[40] See EPA TDD 2001 - New Facilities, p. 3-33; Badger Power EIS, at 54; Public Service Commission of Wisconsin/Wisconsin Department of Natural Resources, Final Environmental Impact Statement, Badger Generating Company, LLC, Electric Generation and Transmission Facilities (June 2000, 9340-CE-100), Executive Summary, p. 6; "AES Londonderry Highlights" (AES, Inc., January 18, 2002), p. 6.

[41] December 2001 USGenNE 316(a) and (b) Demonstration, Vol. III (Tab: Section 308 Information Request Submittal - 9/10/01, Report on Fogging and Icing Effects Associated with Cooling Towers at Brayton Point Station (September 2001), Appendix B, p. 1 (Table: Hours of Plume Induced Fogging and Icing Summary)

concludes that both the permittee's vapor emission rate and hence cooling tower plume impacts are overestimated.[42]

Experience at other sites supports EPA's conclusion. Cooling tower technology, including cooling using salt and brackish water, has been installed at numerous plant locations throughout the United States and the world. The practical experience of operating towers, has shown that fogging and icing of nearby roadways is minimal. To the extent it is a problem, however, EPA has considered a number of different feasible approaches for abating the concern, and these approaches could be combined by the permittee to achieve an optimal configuration.

Commenters have also expressed concern about the aesthetic impact of the cooling towers themselves. When considering the current appearance of BPS, a huge industrial facility with large buildings, tall smoke stacks, and electrical transmission lines on the site, the addition of mechanical-draft cooling towers would not be out of character with the surroundings at the plant.[43] Also, further assessments have been made that indicate the number of cooling tower cells needed for cooling may be reduced from 72 cells to "just over 60,"[44] or perhaps even less. EPA does not believe that this concern should be regarded as a significant and unacceptable impact when weighed against the environmental benefits of retrofitting the cooling towers.

In response to comments regarding potential noise impacts, EPA further evaluated noise impacts, including conducting on-site noise investigation. From this evaluation, EPA concludes that if further noise mitigation is needed, "cooling towers can be installed using technology known to the industry without violating the Massachusetts regulation and at a level that would be acceptable in most jurisdictions."[45] It might potentially require noise mitigation measures beyond simply low noise fans, but this would be well within the current state of the art for the industry.[46] Ultimately, state noise standards will have to be met and the MA DEP will determine whether and what mitigation is needed.

In summary, EPA has considered the adverse environmental impacts from cooling towers and concludes that these impacts are either minimal or can be managed using available technologies.

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[42] Kirk, Winges, An Evaluation of Cooling Tower Plume Studies Done for the Brayton Point Generating Station, MFG, Inc., July, 2003.

[43] See Public Service Commission of Wisconsin/Wisconsin Department of Natural Resources, Final Environmental Impact Statement, Badger Generating Company, LLC, Electric Generation and Transmission Facilities (June 2000, 9340-CE-100), Executive Summary, p. 6.

[44] Kirk, Winges, An Evaluation of Cooling Tower Plume Studies Done for the Brayton Point Generating Station, MFG, Inc., July, 2003.

[45] Hatch, Brayton Point Power Station Cooling Towers Noise Impact Assessment, September 29, 2003.

[46] The Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437 Vol. 1), 4.3.7 Noise Impacts, U.S. Nuclear Regulatory Commission, May 1996, stated the following general points regarding noise at power plants: "Natural-draft and mechanical-draft cooling towers emit noise of a broadband nature, whereas transformers emit noise of a specific tonal nature .... Because of the broadband character of the cooling towers, the noise associated with them is largely indistinguishable and less obtrusive than transformer noise or loudspeaker noise. Transformer noise is distinct because of its specific low frequencies. These low frequencies are not attenuated with distance and intervening materials as much as higher frequencies are; thus, low frequencies are more noticeable and obtrusive. However, at most sites employing cooling towers, transformer noise is masked by the broadband cooling tower noise."

Response #: IV.92	Document #:1177

Comment
One commenter asked the company to "... consider using 30 cooling towers ..." as an alternative to the company's proposed 20-cell tower.

Response
EPA understands this comment to suggest that the company could expand its multi-mode cooling tower design to incorporate more cells, thereby providing cooling capacity for more operating units. As previously stated, EPA is basing this permit on the entire station closed-cycle cooling system and does not believe that modifications to the enhanced multi-mode system would provide the reduction of heat and flow needed to satisfy the CWA.

Response #: IV.93	Document #:1210

Comment
One commenter questioned the use of cooling towers for saltwater and stated that "... the technology should be proven before we implement it ...."

Response
Cooling tower technology, including cooling towers using salt and brackish water, has been installed at numerous plant locations throughout the United States and the world. The use of cooling tower technology at these plants demonstrates that it is both available and effective for use at power plants. For more detailed discussion of the availability and appropriateness of cooling tower technology, see EPA's responses regarding best available technology elsewhere in this document.

Response #'s: IV.94	Document #'s: 1148

Comment
One commenter supported the Draft Permit but asked EPA to reconsider dry cooling as BAT for thermal discharges and BTA under § 316(b). The commenter acknowledged that EPA briefly considered dry cooling but the analysis was abbreviated and not carried forward for more detailed analysis. The commenter listed several reasons for EPA to reconsider dry cooling:

1. The land use pattern is likely to remain industrial for the long term (>50 yr) and should be considered for the "long-term amortization schedule as part of the feasibility and wholly disproportionate cost analysis."
2. The Mystic and Fore River plants have expanded and retrofitted using dry cooling, and both are in estuarine locations.
3. Neither USGen NE nor EPA has determined that dry cooling is infeasible at the site.
4. If wet cooling is approved, it will likely result in "attendant consequences on regulatory agencies, taxpayers, and the Mount Hope Bay ecosystem."
5. Any siting of new steam electric generating stations in estuarine areas would probably be limited to facilities with dry cooling only.

Response
EPA believes that its analysis for dry cooling at BPS was adequate for the purpose of setting both CWA § 316(b) intake limits and §§ 301/304 BAT effluent discharge limits. EPA has not pursued analysis of dry cooling further in response to comments.

EPA agrees that the land use pattern is likely to remain industrial but notes that it based its cost on the expected useful life of the equipment. EPA agrees that the above-mentioned facilities have been expanded and use dry cooling, but disagrees that the facilities have "retrofitted" existing generating units with once-through cooling systems with dry cooling. Instead, these facilities involved installation of new units with dry cooling at the sites of existing power plants.

While EPA agrees that that Agency has not actually determined that dry cooling would be impracticable at BPS, we also have not been able to determine that it would be practicable. This is because we have been unable to find a single example of a power plant converting existing generating units from open-cycle cooling to entirely closed-cycle cooling using dry cooling technology. Furthermore, we recognize that such a conversion would be a significantly more complex engineering task than a conversion to closed-cycle cooling using mechanical draft wet cooling towers, would likely pose more difficult problems related to space constraints at the site, and would be much more expensive.

EPA disagrees that any siting of new facilities in estuarine locations would necessarily be limited to dry-cooled facilities. As an example, the recently permitted Newington Power Plant in Newington, New Hampshire, is located adjacent to an estuary and uses wet cooling towers. As EPA has explained, the use of wet mechanical draft cooling towers can achieve an approximately 95 percent reduction in water use as compared to an open-cycle cooling system.

Response #'s: IV.95-110	**Document #'s**: 1132, 1133, 1150, 1175

96. Comment

One commenter stated that EPA did not show that allowing BPS to switch to once-through cooling for 122 hours per year—thereby allowing up to 6.8 billion gallons per year of additional water withdrawal over that which is allowed by the 56 MGD limit associated with closed-cycle cooling—would minimize adverse environmental impacts as required by CWA § 316(b). The commenter further stated that while EPA appears to have concluded that this allowance would not significantly increase entrainment and impingement, the Draft Permit provides no estimate of what the increased losses would be. The commenter stated that the allowance of an additional 6.8 billion gallons of withdrawal per year over the 56 MGD limit "raises questions" about whether CWA § 316(b)'s BTA requirements have been met or whether, instead, the proposed limits are too lenient. The commenter also stated that fogging and icing concerns related to closed-cycle cooling did not warrant such a variation from the general intake flow limit and that these concerns could be addressed, if necessary, under standard permit bypass conditions (citing 40 CFR § 122.41(m)). The commenter states the view that the Draft Permit "creates a set of perverse incentives for the applicant" that will likely lead to BPS switching to once-through cooling more than is necessary, at a potential cost to the fishery. (1132)

Response

The 122 hours of once-through cooling comes from the § 316(a) variance-based thermal discharge limits and what EPA has determined is sufficient to assure the protection and propagation of the BIP. EPA believes that the additional 122 hours (5 days) of once-through cooling per year would not significantly increase entrainment and impingement in light of the large reduction the permit requires, and that adverse environmental impacts will still be minimized. In addition, in response to comments from the RI DEM, EPA has included as a condition in the permit the restriction that once-through cooling may not be used during the winter flounder spawning season (February through May). This will help reduce the entrainment affects of any once-through cooling operations. EPA has also noted that the 122 hours of once-through cooling will have the added advantage of giving BPS a potential additional option of dealing with cooling tower plume hazards, if any, that might develop (albeit not during the winter flounder spawning season). These hours may be sufficient to offset the plume-based hazard predicted by the permittee, except during the winter flounder spawning season. It should be noted that EPA questions the permittee's prediction of the hazard and believes the permittee is overstating it, as is discussed elsewhere in this document. Finally, EPA does not believe that the bypass regulations (40 CFR § 122.41(m)) would properly apply to a situation such as this, where the potential problem is foreseen and can be dealt with either technologically (with plume abatement towers) or by shutting units down if no other choice exists. Of course, if a shutdown itself would cause problems meeting the bypass standard, then the bypass regulations might apply.

97. Comment

Several commenters agreed with EPA's legal assessment of BTA in the Permit Determinations Document. (1132, 1175) They noted that CWA § 316(b) requires that the design, construction, location, and capacity of cooling water intake structures reflect the BTA for minimizing adverse environmental impact. One commenter noted that in its preamble to the 1976 regulations for BTA, EPA interpreted § 316(b) as requiring EPA to "select the most effective means of minimizing ... adverse effects." (1132) The commenter further noted that EPA also reads an economic element into availability analysis—citing House Report comments on the 1972 CWA amendments that BTA "is intended to be interpreted to mean the best technology available commercially at an economically practicable cost"—and states that EPA thoroughly addressed this element in its BTA analysis. (1132)

Response

EPA agrees with these comments, but would add that EPA has also interpreted CWA § 316(b) to authorize the application of a wholly disproportionate cost test in assessing the appropriateness of the costs to be incurred by a regulated entity (or entities) to comply with BTA-based cooling water intake structure requirements. These issues are discussed in detail in EPA's July 22, 2002, Permit Determinations Document and elsewhere in this document.

98. Comment

Several commenters agreed with EPA's determination that closed-cycle cooling constitutes BTA at the station and is the only option that would adequately minimize environmental impacts. (1132, 1133) One commenter noted that closed-cycle cooling is clearly an available technology, as demonstrated by the many existing once-through plants that have converted to closed-cycle cooling. (1132) Another stated that even the intake and discharge of a closed-cycle cooling system would necessitate a variance from State water quality standards. (1133) While these commenters supported the permit limits based on the availability of closed-cycle cooling, they did raise questions regarding whether the Draft Permit's proposed CWA § 316(b) requirements were too lenient largely because of the allowance given for 122 hours per year of once-through cooling and because the permit did not require the use of gray water to further minimize water withdrawals.

Response

EPA agrees with the commenters that, based on the facts of this particular case, intake capacity limitations based on changing BPS's once-through cooling system to closed-cycle cooling using wet cooling towers reflect the BTA for minimizing adverse impacts from the operation of the cooling water intake structure. The permittee's own § 316(b) demonstration documents indicate the feasibility/availability of such a retrofit at BPS for all or some of the generating units. For example, the permittee's proposed Enhanced Multi-Mode cooling system involves the retrofit of BPS's cooling system to a partially closed-cycle system, while the permittee also set forth an approach to converting the open-cycle cooling system to closed-cycle using mechanical draft wet cooling towers for all four generating units.

Furthermore, EPA has learned that retrofits from open-cycle to closed-cycle cooling systems have been accomplished at a number of existing power plants. Several of these systems are discussed in EPA's July 22, 2002, Permit Determinations Document. EPA has also learned of additional retrofits of open-cycle cooling systems to closed-cycle cooling systems that are planned or under way at other existing power plants. For example, EPA knows of conversions from once-through, open-cycle cooling to closed-cycle cooling using mechanical draft wet cooling towers that are planned or under way for all generating units at the following power plants: Georgia Power (Yates Plant); Georgia Power (McDonough Plant); and Wateree Station (South Carolina). In addition, EPA has also learned of two plants in Indiana that have retrofitted "helper cooling towers" to their formerly entirely once-through cooling systems: Cinergy Cayuga and the Hoosier Energy—Ratts power plant. There might, of course, be other plants that have undergone such conversions in the United States or elsewhere, but these are the plants EPA has been able to identify.

EPA recognizes that the permittee has argued that these examples are distinguishable from the case of BPS and do not support the conclusion that such a conversion would work at BPS. The permittee's comments in this regard are addressed in detail elsewhere in this document, but will be briefly addressed here as well. EPA agrees that the facts related to these facilities are not uniformly identical to those at BPS. This will always be the case, however, as no two plants are **exactly** alike. EPA has determined that the plants are similar enough to BPS in critical respects to establish that a conversion from once-through to closed-cycle cooling is generally **available** and would be the **best** performing technology for reducing adverse environmental effects by virtue of the very substantial reduction in intake flow that could be achieved. EPA's July 22, 2002, Permit Determinations Document discusses this in more detail. See also Chapter 4 of the document (discussion of BAT for controlling thermal **discharges**). EPA has also determined that such conversion is specifically feasible at BPS, and the permittee has not provided any compelling arguments to the contrary.

The issues raised regarding State water quality standards, the once-through cooling allowance, and the use of gray water for cooling are discussed elsewhere in this document.

99. Comment
Two commenters noted that consideration of costs is not of key importance in determining BTA under 316(b) and that EPA is obligated to select the "most effective means of minimizing adverse effects." (1132, 1133) One commenter stated that EPA correctly applied the "wholly disproportionate" test in its 316(b) analysis. The commenter pointed out that in the absence of any statutory or regulatory requirement to consider costs, EPA has developed the "wholly disproportionate test," which requires only a general consideration of costs. The commenter pointed to the legislative history indicating that Congress intended the CWA to force new technologies on existing pollution sources and expressly rejected any economic hardship exemptions, noting that Congress accepted the possibility that compliance with the statute could even lead to the loss of jobs and plant closures for power plants. The commenter concluded that any consideration of costs is clearly secondary to the statutory mandate to require BTA to minimize environmental impacts. (1132)

Response
EPA agrees that it has properly applied the "wholly disproportionate cost test" under CWA § 316(b). EPA also agrees that this cost test requires only a general consideration of costs, rather than a detailed, strict cost-benefit test. This test is discussed in detail in EPA's July 22, 2002, Permit Determinations Document.

Nevertheless, in developing this permit, EPA has gone well beyond the minimum necessary consideration of costs and benefits. Other assessments of costs and benefits in the application of the wholly disproportionate cost test under CWA § 316(a) that EPA has seen have been far less detailed. See, e.g., *In re Public Service Company of New Hampshire (Seabrook Station, Units 1 and 2),* 10 ERC 1257, 1261 (NPDES Permit Application No. NH 0020338, Case No. 76-7; June 17, 1977) (Decision of the Administrator); *In the Matter of Florida Power Corporation, Crystal River Power Plant, Units 1, 2 and*

3, Citrus County, Florida (Findings and Determinations Pursuant to 33 U.S.C. § 1326; NPDES Permit No. FL 0000159), p. 8. Still, although EPA considered costs and benefits in greater detail for the BPS permit than is required under CWA § 316(b), the Agency nevertheless properly weighed this information when applying the wholly disproportionate cost test and making § 316(b) determinations for the permit.

EPA agrees with the commenter that Congress generally intended CWA technology standards to be "technology-forcing" mechanisms that would reduce adverse environmental impacts to the extent achievable with the use of certain levels of available technology. EPA further agrees that Congress understood that there would likely be some adverse economic ramifications, at least for some facilities, from this technology-oriented approach, but that Congress also concluded that environmental improvements would be achieved more quickly as a result and that this was a worthwhile trade-off. See, e.g., *Environmental Protection Agency* v. *National Crushed Stone Association*, 449 U.S. 64, 71 (1980).

EPA also agrees with the commenter that, as a general matter, cost was not intended to be the principal driving force behind a § 316(b) determination. Use of the wholly disproportionate cost test, as opposed to a strict cost-benefit analysis, indicates that the consideration of cost was not to be considered the preeminent factor in setting BTA-based limitations under CWA § 316(b).

Yet, the fact remains that cost **is** relevant to making a § 316(b) determination, as EPA has interpreted that provision of the law. As stated above, EPA applies a wholly disproportionate cost test. Application of this test **could** result in a decision not to impose limitations based on the BTA if its costs would be wholly disproportionate to its benefits. In any event, EPA has applied this economic test to the BPS permit and concluded that the costs of meeting cooling water intake structure capacity limits that reflect BTA for minimizing adverse environmental impact are **not** wholly disproportionate to the benefits of doing so.

Finally, it should also be noted that EPA has also interpreted CWA § 316(b) "best technology available" standard to require consideration of whether the costs of compliance would be economically practicable. In the preamble to the 1976 proposed Final CWA § 316(b) regulations, EPA stated the following:

> No comparison of monetary costs with the social benefits of minimizing adverse environmental impacts, much less a formal, quantified "cost/benefit" assessment, is required by the terms of Act. The statute directs the Agency to insure that enumerated aspects of cooling water intake structures reflect the best technology available for minimizing adverse environmental impacts. Once such adverse effects have been identified (or, in the case of new structures, predicted) then the effort must be to select the most effective means of minimizing (i.e., "reducing to the smallest possible amount or degree") those adverse effects. The brief legislative history of section 316(b) states that the term "best technology available" contemplates the best technology available commercially at an economically practicable cost. As with the statute, this language does not require a formal or informal "cost/benefit" assessment. Rather, the term "available commercially at an economically practicable cost" reflects a Congressional concern that the application of "best technology available" should not impose an impracticable and unbearable economic burden on the operation of any plant subject to section 316(b). Since the regulations require a case-by-case determination of the best available technology, consideration of the economic practicability of installing that technology must necessarily be conducted on a similarly individualized basis.[41 Fed. Reg. 17388

> (April 26, 1976) (Final CWA § 316(b) regulations later withdrawn by EPA after remand by Federal court on procedural grounds)] The economic practicability consideration is discussed in more detail in EPA's July 22, 2002, Permit Determinations Document. EPA has determined that cooling system upgrades capable of enabling BPS to comply with the proposed permit limits based on BTA are not economically impracticable.

100. Comment
Several commenters supported EPA's assessment of the benefits of closed-cycle cooling under 316(b), noting that the statute does not require a strict cost-benefit analysis and supporting EPA's use of the "wholly disproportionate cost" test. (1132, 1133) One commenter believed that EPA appropriately assessed the environmental value of a healthy ecosystem in Mount Hope Bay by multiple methods, including the "benefits transfer" analysis (which underestimated the full ecosystem benefits of closed-cycle cooling), the "per-person recreational and nonuse value" analysis (which more fully captured nonuse values of closed-cycle cooling), and the "habitat-based restoration cost" (HRC) analysis. The commenter concluded that in the absence of readily available, accurate benefit valuation techniques for the full range of values of the aquatic ecosystem, HRC—which is derived from replacement cost methods consistently upheld by courts in natural resources damages cases—is a useful and appropriate method for evaluating benefits under 316(b). (1132) Another commenter believed that the HRC analysis might actually underestimate the public costs of pollution from BPS. (1133)

Response
EPA generally agrees with the comments, with the following clarifications and qualifications.

All of the methods of monetizing the benefits of the environmental improvements that would result from compliance with the new permit result in imperfect estimates. It is simply not possible to measure those benefits completely and with total accuracy. This is especially true when it comes to trying to develop monetary estimates of the nonuse value of these ecological improvements. Thus, all of EPA's benefits values are estimates. The same is true of the benefits values proposed by the permittee in its comments on the Draft Permit. (It should be noted that the permittee provided no analysis of benefits with its CWA § 316(b) demonstration documents, though it cited certain benefits values with no explanation of how they were derived. The permittee also did not develop any estimates of nonuse values.)

In response to this problem of unavoidable uncertainty about the "correct" benefits figures, EPA took several steps that it believes are reasonable and appropriate. EPA considered benefits from a qualitative perspective, consistent with sound economic principles. In addition, the Agency considered both use values and nonuse values from a number of analytical perspectives. EPA did not ignore values that are likely to exist simply because it is difficult to calculate them. EPA used various methods to produce a range of values and to judge the likely reasonableness of this range. The Agency provided values from what it referred to as "the benefits transfer analysis" as well as from what it referred to as the "per-person recreational and nonuse value" analysis. Both analyses were conservatively conducted, and the Agency explained the limitations of each. In addition, EPA conducted an analysis to test the reasonableness of the per-person recreational and nonuse values, and the analysis confirmed that values were reasonable.

Finally, EPA also conducted a Habitat Restoration Cost (HRC) analysis based on the Habitat Equivalency Analysis (HEA) method often used in natural resource damages cases. EPA explained that while the HRC analysis did **not** provide a direct estimate of total benefits values, the analysis did provide useful information to consider. First, by generating an estimate of what environmentally sound restoration efforts would cost the public to restore the fish lost to the intake, the HRC figures provide a useful point of comparison with the cost to the permittee of installing the BTA. Second, EPA indicated that the HRC figures might be useful for gauging the reasonableness of other estimates, since some limited information suggested that these values would likely be less than a total value estimate. The permittee argues that HRC values are just as likely to overstate total benefits values. EPA agrees that it is possible that they will do so, though the information EPA cited in its July 22, 2002, Permit Determinations Document suggests otherwise. EPA certainly does not want to make too much of this point, however, and did not rely on it for its conclusions. Elsewhere in this document, EPA responds in more detail to the permittee's comments on the HRC values. EPA should also state that it agrees with the present commenter that the HRC values might understate the "public costs of pollution." As the text of the HRC analysis explained, its calculations were conservative (i.e., would tend to understate HRC values) in a number of respects.

EPA did not conduct a full-blown, site-specific contingent valuation study to assess nonuse values for the resources in question because the Agency did not have the money or time to complete such an analysis. Nor is such an analysis needed here. As discussed in EPA's July 22, 2002, Permit Determinations Document, the consideration of costs (and benefits) necessary to apply the wholly disproportionate cost test under CWA § 316(b) need not be precise, and a detailed cost-benefit analysis is not required. Furthermore, while the permittee suggests in some of its comments that a contingent valuation study is the only acceptable means to estimate nonuse values, EPA believes there are also other reasonable, cost-feasible ways to estimate such values, such as the per-person nonuse value analysis that the Agency conducted. This approach is a type of "benefits transfer" analysis.[47]

Despite the fact that EPA was not required to develop precise cost and benefit estimates, EPA also made certain improvements to its benefits analyses in response to specific criticisms that the permittee presented in its comments. These improved analyses help to provide a modified range of benefit values. These revised values, however, continue to support the conclusion that the costs of meeting the permit limits are **not** wholly disproportionate to the benefits that would result.

EPA's original benefits analyses for the Draft Permit are discussed in detail in EPA's July 22, 2002, Permit Determinations Document as well as elsewhere in this document, while EPA's modified benefits analyses are discussed in more detail elsewhere in this document.

101. Comment
One commenter stated that, contrary to what the permittee urges EPA to do, EPA is barred from relying on a cost-benefit analysis to determine permit requirements necessary to satisfy CWA § 316(b).

Response
EPA agrees that under the language of CWA § 316(b) and EPA's existing interpretations of the provision, the Agency would be barred from setting permit limitations under § 316(b) based solely on a strict cost-benefit analysis. At the same time, as EPA has explained in detail in the July 22, 2002, Permit Determinations Document and elsewhere in this document, EPA has long interpreted CWA § 316(b) to authorize the Agency to apply the wholly disproportionate cost test. This does, of course, involve a consideration of costs and benefits, but it does not require a strict cost-benefit test. As is also discussed in EPA's July 22, 2002, Permit Determinations Document, the Agency has not changed its interpretation of § 316(b) to bar **all** consideration of costs and benefits in response to the case of *Whitman* v. *American Trucking Association*, 531 U.S. 457 (2001).

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[47] It should be noted that, as discussed above, EPA used the phrase "benefits transfer analysis" to refer to one of the specific benefits analyses that EPA carried out for the Draft Permit. This was probably a poor choice of labels in that "benefits transfer" more generally refers to the class of analytical approaches that try to use values from studies in the literature to serve as part of the basis for value estimates in other specific cases.

102. Comment

One commenter stated that the environmental benefits of reducing cooling water intake had not been adequately assessed. The commenter noted that: (1) complete costs to be incurred by the permittee are being compared to a restricted subset of benefits, a comparison that greatly underestimates the value of Mount Hope Bay and the total impacts of BPS's operations; (2) the company erroneously compared the estimated losses at the plant to the broader regional stock rather than the populations in the specific waterbody at issue; (3) only a subset of the species impacted by entrainment and impingement are valued, and this results in an underestimate of the benefits of reduced impacts; and (4) RI DEM employee Mark Gibson's 2002 estimate of "ex-vessel" losses due to BPS's operations also underestimates natural resource damages caused by BPS because the analysis leaves out many important factors, as Gibson acknowledges. The commenter concluded that, as a result, the comparisons of costs and benefits that have been presented are inadequate and are skewed to understate the benefits. (1133)

Response

It should be remembered that CWA § 316(b) does not require either a strict or precise cost-benefit analysis. Consideration of costs and benefits using reasonable approaches to developing estimates is sufficient for EPA's § 316(b) determination for the permit.

EPA has determined that, as is often the case, there is significant uncertainty surrounding the estimates of both the cost of upgrading the BPS cooling system to meet the new permit limitations, and the monetized value of the environmental benefits to be achieved from these improvements. Neither monetized benefit values nor future costs can be predicted with total completeness and accuracy. While some elements of a cost estimate more readily lend themselves to precise prediction (such as the cost of a particular piece of equipment), the reality is that the assessment of the cost over time of making technological and associated operational changes at a power plant is a predictive exercise that unavoidably depends on the use of assumptions, predictions, and models regarding facts and the relationships between facts that may or may not accurately reflect reality. For example, cost estimates in this case depend not only on estimates of the cost of equipment, but also on estimates of construction needs, labor costs, discount rates, future electricity prices, and many other factors.

The fact that the permittee has submitted very detailed estimates of the costs of retrofitting closed-cycle cooling at BPS, and very little information concerning benefit estimates (no nonuse value estimates and no detailed estimates whatsoever in its CWA § 316(b) demonstration), should not lead one to forget that these cost figures are still just imperfect estimates. Of course, it may **become** possible to more accurately quantify the cost of installing a new technology **after** it has been put in place and operated over time, whereas benefits figures will forever be imperfect estimates. Yet, that does not change the fact that the costs EPA is dealing with here are still imperfect, predictive estimates. Even the permittee has indicated that its costs were proffered with an estimated +/- 25 percent degree of accuracy; and this stated range of error is itself only a rough estimate.

In light of all this, EPA has tried to review both cost and benefit figures with an appropriately critical eye. The Agency has considered the cost and benefit estimates provided by the permittee and any other parties (such as Mark Gibson's benefits analysis), and has developed its own independent estimates using multiple appropriate methods. From this work, the Agency has estimated a reasonable range of values for both costs and benefits. Taking these figures into account together with a qualitative (i.e., nonmonetary) assessment of the aquatic environmental benefits of complying with the permit, along with a consideration of other relevant factors, such as nonwater environmental effects and energy effects that might arise from the installation of a closed-cycle cooling system, EPA has concluded that the costs of complying with the permit's CWA § 316(b)-based requirements are not wholly disproportionate to the benefits. Cost and benefit estimates and analyses are presented and discussed in detail in EPA's July 22, 2002, Permit Determinations Document and elsewhere in this document.

Turning to the more specific comments summarized above, EPA offers the following responses. First, EPA agrees that its benefits estimates are incomplete in several important ways and that, as a result, these estimates would tend to understate benefit values. For example, as the commenter mentions, no benefit is calculated for some of the fish that would be saved by the plant complying with the proposed permit limits. In its benefits analyses, EPA has tried to identify factors in the analysis that are likely to yield an underestimate of benefits. EPA has also tried to identify factors that might tend to yield an overstatement of benefits. On balance, EPA believes its estimates are likely to be reasonably conservative (i.e., most likely would tend to understate benefits). In addition, in light of the unavoidable inability to fully calculate benefits, EPA has considered benefits from a qualitative perspective as well. Second, EPA also agrees that Mark Gibson's ex-vessel benefits analysis only attempts to quantify a small segment of the total benefits, as Gibson recognizes himself.

Third, EPA agrees that the effect of BPS's intake should be assessed in terms of estimated losses as compared to the populations that should exist in the specific source waterbody at issue (i.e., Mount Hope Bay), rather than solely in terms of a comparison of estimated losses at the plant to the broader regional stock. The permittee emphasizes the latter comparison, and EPA did in fact consider it, but we agree with the commenter that relying on it alone would mask the actual magnitude of the adverse environmental impact of the power plant's impact on the specific receiving water, which is relevant under CWA § 316(b) and applicable water quality standards.

103. Comment

One commenter agreed with EPA's conclusions regarding costs to PG&E, and further noted that societal costs are minimal because: (1) while increased costs might cut into PG&E's profits, it is unlikely that there would be any impact at all on consumers; (2) BPS's costs are consistently so much lower than the market price that the plant is extremely profitable and will continue to be so even after new controls are installed; and (3) the New England electricity supply is adequate even without BPS. The commenter stated that BPS's owners have been making "extra" profits for decades by operating under a variance and violating State water quality standards, while harming the environment. The commenter also stated that with a closed-cycle system the plant would make further profits due to the "Avoided Load Loss" during peak demand conditions. The commenter noted that if EPA was to consider any of BPS's cost arguments, it also should recognize the costs incurred by the State of Rhode Island—costs to its environment, to commercial fishing, to the recreational industry—all while BPS used the State's natural resources free of charge. (1132) The commenter stated that fishing is a major economic driver in Rhode Island, generating 4,687 jobs and $758 million in direct sales and a total economic impact of $1.7 billion. The commenter also stated that the City of Fall River has undertaken a $150 million CSO project to help restore the bay, and the City supports the permit to address the impacts of the major source of pollution in the bay. The commenter concluded that it was "time for PG&E to do its part." Accordingly, the commenter concluded that the costs associated with closed-cycle cooling are "clearly not disproportionate to the significant benefits associated with the restoration" of the Mount Hope Bay ecosystem.

Response

The commenter agreed with EPA's assessment of the cost to the permittee of complying with the permit. EPA notes that it has made some adjustments to its cost estimates based on comments received, and the revised cost estimates are discussed in detail elsewhere in this document. This has resulted in some increase in the range of compliance cost estimates, but these changes have not been so significant as to change EPA's final permitting determinations under CWA § 316(b).

The commenter also stated that the **cost to society** would be "minimal" were the permittee to incur the compliance costs. How one assesses the cost to society, of course, depends on how one defines those costs. The commenter stated that while the compliance costs might reduce the permittee's profits, it would have little effect on consumer electric rates. EPA agrees that it is appropriate for the Agency to consider the possible effect of compliance costs on consumer electric rates. Thus, EPA undertook a detailed analysis of the issue for the Draft Permit, and concluded that the effect was small and did not alter its conclusions regarding BTA-based intake limitations under CWA § 316(b).[48] While the permittee has at times conceded that the compliance costs would not cause any significant consumer rate impacts—only profit impacts—the permittee did submit comments questioning some aspects of the Agency's consumer rate. These are responded to elsewhere in this document. Having considered the comments received, EPA has concluded that its rate analysis was reasonable and appropriate. EPA has, however, produced somewhat modified estimates of consumer rate effects. These modifications occur largely because EPA's compliance cost estimates have been revised to some degree. The new rate effect estimates are discussed in detail elsewhere in this document. It is sufficient to say here that EPA continues to conclude that the consumer rate impacts will be small and do not alter the Agency's conclusion regarding CWA § 316(b) limitations.

EPA also proposed a "social cost" analysis that translated the estimated cost of compliance to the permittee to a cost-to-society framework consistent with economic theory. EPA has also revised its social cost analysis in response to comments, most especially the revised technology cost estimates. In this context, EPA does not agree that there are no social costs of complying with the CWA § 316(b) requirements, but it believes these costs are **not** wholly disproportionate to the benefits to society of doing so.

The commenter agreed with EPA's conclusion that the cost of complying with the permit limitations is likely to cut into BPS's profits, but that this should not be so severe as to lead to the shutdown of the plant. The commenter further agreed that BPS's low-cost generation makes it highly profitable under the current deregulated electricity market, and that it should remain highly profitable even after incurring expenses for complying with the NPDES permit. BPS itself appears to agree that the costs of compliance will reduce profits but not lead to a shutdown. BPS argues, however, that the plant will suffer economically more than EPA concluded because the Agency has underestimated the expense of the cooling system improvements and overestimated BPS's profitability. EPA addresses these comments elsewhere in this document, but notes here that while the Agency has made some revisions to its calculations in response to comments, it continues to conclude that the necessary compliance measures are technologically and economically feasible and their costs are not wholly disproportionate to their benefits.

Third, the commenter stated that New England's electric supply would remain adequate even without the electricity provided by BPS. EPA believes that it is not necessary to resolve this issue for the permit, because the permit should not result in the closure of the power plant. Indeed, the permittee did not argue that it would. That being said, it does appear that there is presently adequate electric capacity to meet the region's demand even if BPS were to shut down. See ISO New England CELT Report and Press Release (April 2003) (AR 3171). Furthermore, since many power plant expansion proposals have been put on hold or terminated due to the adequacy of the region's electricity supply, if BPS shut down, and more

[48] In its "Initial Decision" re Permit No. NC0007064 concerning the Brunswick Station power plant in North Carolina, EPA Region 4 determined that the cost of retrofitting the power plant with cooling towers was not wholly disproportionate to the benefits of doing so where installing cooling towers would result in an average 2.5 percent increase in residential consumer electric rates, but as a result of flow restrictions would achieve a 96 percent reduction in adverse impacts. See *In the Matter of Carolina Power and Light Company (Brunswick Steam Electric Plant, Units 1 and 2)* [(National Pollutant Discharge Elimination System Permit No. NC 0007064)] (Decision by EPA Region 4) (November 7, 1977). See also May, J. and van Rossum, M., "The Quick and the Dead: Fish Entrainment, Entrapment, and the Implementation and Application of Section 316(b) of the Clean Water Act," 20 Vt. L. R. 373, 412 (1995).

electricity was needed in the region, new generating capacity could likely be brought on line to meet that need.

Still, a closure of BPS would be a very significant occurrence in many respects because BPS is a large plant that provides relatively inexpensive electricity to the grid. As a result, its three coal-burning units are baseload generators. If these units shut down and were replaced by more expensive generation, it would likely raise consumer rates to some extent. Some idea of the effect can be gleaned from EPA's analysis of the temporary rate effect that would occur from temporary unit shutdowns during construction for cooling system retrofits. Making this type of rate impact permanent, however, would extend this effect over time, resulting in a much greater potential effect, though the impact would not necessarily be so significant as to render the proposed permit limits inappropriate. The overall effect would depend on the price of the generation that replaced BPS's generation. A closure of the power plant would also obviously harm the plant's employees and, as is discussed elsewhere in this document, would eliminate a major source of tax revenue to the Town of Somerset. At the same time, the long-term effect on the Town would depend on what replaced the facility on the peninsula. Finally, a closure would also result in a substantial reduction in air pollutant emissions in the region, since BPS is the region's largest single facility emitter of ozone-forming pollutants, particulates, and greenhouse gases. Such reductions might provide public health and environmental benefits, and would create room for other emission sources to increase their emissions without preventing the state from meeting CAA standards.

In any event, EPA does not believe there is a realistic likelihood that achieving compliance with the NPDES permit will cause BPS to be closed. Therefore, there is no need to assess these issues further.

EPA agrees that if one posits that BPS should have been required to install these cooling system improvements in the past, then one can say BPS has reaped an "economic benefit" from being allowed to delay the expenditure. This is discussed in EPA's July 22, 2002, Permit Determinations Document. At the same time, however, past permit limits did not expressly command that that BPS make these cooling system improvements. EPA also agrees that its current understanding of the plant's contribution to damaging the ecology of Mount Hope Bay, including its fish populations, indicates that the plant has harmed the environment and the natural resources of the United States, the Commonwealth of Massachusetts, and Rhode Island. This has included killing fish and harming habitat in order to make electricity, which is not a beneficial use of those public resources. EPA recognizes the economic importance of fishing to the Rhode Island economy.

EPA agrees that with cooling towers in place, BPS would be able to generate more electricity during peak demand (i.e., hot summer months) without causing permit violations. This should result in increased profits at those times. However, while this will offset the costs of installing cooling towers to some extent, EPA's analysis indicates these profits will be more than offset by the cost of installing and operating the cooling towers. Thus, the cooling tower installation would still be a net loss of profits for the company. The permittee's analysis of this issue essentially agreed with these general points. EPA's detailed analysis in this regard is presented in EPA's July 22, 2002, Permit Determinations Document and is further discussed elsewhere in this document.

Like the commenter, EPA has also noted the steps taken by parties other than BPS to improve the environmental condition of the Mount Hope Bay ecosystem. These steps have included fishing restrictions and greater water pollution control by parties such as the City of Fall River. These steps do not by themselves indicate that BPS is required to do anything in particular; BPS must do what it is required to do by the CWA. However, it is pertinent to recognize and acknowledge that other factors contributing stress to the Mount Hope Bay ecosystem are being addressed.

EPA also agrees with the commenter that the costs of complying with the permit proposed by EPA are not wholly disproportionate to its benefits.

104. Comment
One commenter concluded that while EPA was correct in deciding the overall BTA standard, it erred under 316(b) in not fully assessing the "gray water" option (i.e., using treated wastewater effluent for cooling water) for minimizing adverse environmental impact. The commenter conceded that the marginal benefits of this option might not justify the potential detriments, but believed that more analysis is necessary to determine the benefits of using a gray water system. The commenter pointed out that a gray water system could reduce the intake flow by 20 MGD (about 2 percent of the entire daily flow). (1132)

Response
The commenter agreed with EPA's overall BTA determination and indicated that EPA's judgment, as discussed in EPA's July 22, 2002, Permit Determinations Document, that the possible detriments of bringing gray water to BPS for cooling water purposes would not justify the potential detriments of trying to develop that project, might be correct. Nevertheless, the commenter pointed out that gray water from Fall River could reduce intake water needs by approximately 20 MGD and argued that EPA did not consider the gray water issue fully and must evaluate it further.

EPA believes that it discussed the "gray water option" in reasonable and appropriate detail in § 7.3.4a(i)(B) of its July 22, 2002, Permit Determinations Document. EPA continues to believe that it is not clear that the gray water option would be feasible, and does not believe that it warrants more detailed analysis at this time. It also should be remembered that this is not an option that the permittee is capable of implementing at BPS on its own. It would need to reach an agreement with a nearby source of a large amount of gray water—most likely the City of Fall River POTW—in order to make this approach possible. Such an agreement would need to be negotiated, and environmental permitting issues related to any proposed cross-bay pipeline for transporting the gray water would need to be resolved. Even assuming all these issues could be resolved, reaching such resolution could take significant time. It would also take time to construct the pipeline to deliver the gray water. All of this could potentially add significant delay to implementation of cooling system improvements.

Therefore, EPA is not prepared to set CWA § 316(b) intake limits based on a determinion that using gray water in conjunction with cooling towers constitutes the BTA for minimizing adverse environmental impacts. At the same time, of course, EPA is in no way **prohibiting** or otherwise precluding the permittee from pursuing this option. If the permittee wishes to pursue the option and can do so while complying with applicable laws, EPA is not standing in its way. (As stated in the July 22, 2002, Permit Determinations Document, however, EPA does believe that further analysis of any potential public health effects from cooling tower air emissions arising from the use of gray water would be warranted.)

105. Comment
One commenter stated that the permittee's February 2001 submittal to EPA did not even attempt to demonstrate that the facility would meet the requirements of § 316(b) and that even the information provided by the permittee as late as December 2001 did not provide the required § 316(b) demonstration. The commenter noted that the permittee refused to determine whether its proposal reflected BTA for minimizing adverse environmental impacts, as required by the CWA, and instead limited its review to technology that would reduce its heat and flow to pre-1984 levels. (1133)

Response
EPA agrees that the permittee's February 2001 submittal was inadequate with respect to providing a CWA § 316(b) demonstration. Issues that needed to be addressed were not addressed in either that

submission or the later May 2001 “Partial 316(a) and (b) demonstration” document. It was not until its December 2001 submission that the permittee finally addressed the CWA § 316(b) issues in any detail.

106. Comment
One commenter noted that there is no support for the permittee’s argument that its operations must result in “actual substantial harm” in order for there to be an “adverse environmental impact” under CWA § 316(b). The commenter stated that there is, nonetheless, ample evidence that BPS’s operations are causing actual and substantial harm. (1133)

Response
EPA largely agrees with these comments. EPA’s views on these issues are discussed further in the Agency’s July 22, 2002, Permit Determinations Document and elsewhere in this document.

107. Comment
One commenter charged that the cost arguments raised by the permittee and others are legally irrelevant and factually unsupported because consumer rate effects are not relevant to the factors that EPA is required to consider in establishing permit conditions. Even if they were relevant, however, they do not merit consideration here because the cost of pollution controls will not be automatically passed on to consumers, since BPS will rarely set the energy clearing price. This commenter hired an expert consulting firm which conducted an analysis concluding that the cost of pollution controls to comply with the Draft Permit conditions would not impact BPS’s overall profitability. The commenter also stated that PG&E-NEG’s overall financial instability is irrelevant to the profitability of BPS and the setting of permit requirements for the plant. (1150) Commenters further stated that New Englanders have no interest in “encouraging PG&E to use BPS as a cash cow to plug financial holes in other far-flung operations,” (1150) and that massive corporations like the permittee “must not offset losses for operating other power plants against Mount Hope Bay.” (1133)

Response
EPA believes that cost arguments are relevant in the development of case-by-case CWA § 316(b) cooling water intake requirements as well as in the development of case-by-case CWA § 301 technology-based thermal discharge requirements. The manner in which costs must be considered for each is discussed in Chapters 7 and 4, respectively, of EPA’s July 22, 2002, Permit Determinations Document, as well as elsewhere in this document. EPA also believes that consideration of consumer electric rate effects can be a relevant consideration in assessing costs while applying the wholly disproportionate cost test under the CWA § 316(b). This is also discussed in Chapter 7 of EPA’s July 22, 2002, Permit Determinations Document as well as elsewhere in this document.

EPA agrees with the comment suggesting that the costs of compliance in this case will not have a particularly significant consumer rate effect, and that this rate effect should not alter the permit limitations. In response to comments, EPA has somewhat increased its earlier consumer rate effect estimates, but these revisions do not change the ultimate conclusion. Consumer rate effects are also discussed in more detail in Chapter 7 of EPA’s July 22, 2002, Permit Determinations Document, as well as elsewhere in this document.

EPA does not believe that it needs to respond to the details of the report by the commenter’s consultant. This report concluded that the cost of pollution controls to comply with the Draft Permit conditions would not impact BPS’s overall profitability. EPA has also concluded that the cost of making the cooling system improvements needed to comply with the permit are affordable and are not wholly disproportionate to the benefits of such compliance. As a result, the permittee will be required to comply with the permit’s limitations (i.e., the performance standards in the permit) and will need either to install the expected cooling tower system or to implement some other lawful plan for complying with the permit's limits. EPA has also concluded that BPS should remain a profitable plant even after incurring the costs of complying with this permit. However, it should be noted that, beyond consideration of whether costs are impracticable, whether or not a plant retains some specific level of profitability is not a necessary condition for imposing particular CWA § 316(b) limitations. Therefore, while noting that the commenter's consultant's analysis generally agrees with EPA's conclusion that the plant will remain profitable even after incurring the costs of compliance, EPA does not believe it needs to respond to the details of the analysis with respect to exactly how profitable BPS will be. It is enough for the Agency to acknowledge that the analysis agrees with EPA's conclusion that the costs of compliance are not impracticable.

EPA essentially agrees with the comment that PG&E-NEG's overall financial instability is irrelevant to setting permit requirements for the plant. As a baseload, coal-burning facility, BPS should be able to profitably generate and sell electricity in New England regardless of problems at other plants within the PG&E-NEG business family or problems with other aspects of PG&E-NEG's business (e.g., energy trading). The bottom line is that the facility must meet CWA standards and the cost of doing so appears to be practicable. It is irrelevant under the CWA whether these costs are incurred by the current owners of the facility or by some new owner after the plant has been sold.

EPA also agrees with the comment that losses in other aspects of the company's business cannot be a legitimate excuse for damaging the environment of Mount Hope Bay in contravention of CWA standards.

108. Comment
One commenter expressed concern that the Draft Permit allows the permittee considerable flexibility in seeking exceptions from full utilization of the closed-cycle cooling system, including time for periodic exceedances of thermal discharge limits. The commenter urged EPA to require that any exception be subject to a demonstration of need by the permittee. (1133)

Response
EPA has discussed this issue elsewhere is these responses to comments. Here we only add that the permit does **not** allow "periodic exceedances of thermal discharge limits." The limits contemplate a stated number of hours of open-cycle cooling.

109. omment
Several commenters stated that EPA has broad discretion in considering costs under § 316(b). One of these commenters further stated that in the context of applying the "wholly disproportionate cost test" under CWA § 316(b), EPA does not have to determine the water quality impact of effluent controls or the economic impact of controls on any specific plant. The commenter cited "*Chemical Manufacturers Assn.* v. *U.S. EPA*, 870 F.2d 177, 204 (5th Cir. 1989) (citing 1972 CWA Leg. Hist. at 170)," in support of the point. (1133)

Response
EPA agrees that the Agency has considerable discretion in considering costs under CWA § 316(b). EPA must, of course, act in a manner consistent with the CWA and with the standards of the Administrative Procedures Act (i.e., the Agency's consideration must neither be arbitrary nor capricious, nor otherwise inconsistent with applicable law). Consistent with the Agency's interpretation of CWA § 316(b), the Region has applied the wholly disproportionate cost test in developing this permit. Within the parameters described above, however, EPA also has considerable discretion in determining how to assess costs and benefits, and then how to assess their relative weights in drawing a conclusion regarding whether or not the costs are wholly disproportionate to the benefits.

As to the second portion of the comment, EPA agrees with it in some respects, but disagrees with it in other respects. EPA agrees that the CWA does not require it to assess the water quality impacts of implementing BAT technology standards for thermal discharges. The Agency believes, however, that it **does** need to assess the environmental effects of implementing BTA requirements under CWA § 316(b). This is because CWA § 316(b) requires that the construction, location, design, and capacity of cooling water intake structures "reflect the best technology available for minimizing adverse environmental impacts." This standard necessarily requires the evaluation of the environmental effects of different technology options to determine whether adverse impacts have been minimized. By contrast, the adequacy of effluent discharge limitations are to be judged according to the specific applicable technology standard (i.e., BCT, BPT, BAT, or new source standards) **and** the technology's ability to achieve or make technologically and economically feasible progress toward achieving the statutory goal of **eliminating** pollutant discharges without the Agency's having to assess the environmental import (i.e., water quality benefit) of achieving the reduced discharge of each specific pollutant. See 33 U.S.C. § 1311(b)(2)(A). Effluent technology standards are discussed in detail in Chapter 4 of the EPA's July 22, 2002, Permit Determinations Document and elsewhere in this document.

EPA agrees that, in developing national technology standards under CWA § 316(b), the Agency is not required to evaluate the environmental effects at individual plants, but rather can assess the effects that would ensue at a national level. At the same time, however, when EPA is implementing § 316(b) on a case-by-case, BPJ basis, EPA interprets the statute to require the assessment of environmental effects at the case-specific level. It is clear to the Agency that this is the appropriate application of the law. The alternative—i.e., that the Agency would attempt to assess environmental effects on a national basis—would clearly make no sense in the context of a case-by-case application of § 316(b). This view is consistent with that stated by EPA in the preamble to EPA's final § 316(b) regulations issued in 1976. 41 Fed. Reg. 17388 (April 26, 1976) (these regulations were later remanded to EPA on procedural grounds).

The same analysis largely holds with respect to the consideration of costs as well. In other words, when developing national technology standards under CWA § 316(b), the Agency is not required to evaluate costs at particular plants, but rather can assess economic issues at the national level. (Note: the manner in which costs must be considered under CWA § 316(b) is discussed in detail in EPA's July 22, 2002, Permitting Determinations Document in Chapter 7 as well as elsewhere in this document.) At the same time, however, when EPA is implementing § 316(b) on a case-by-case, BPJ basis, EPA interprets the statute to require the assessment of costs at the case-specific level. In addition, EPA's regulations for setting effluent limitations on a case-by-case basis indicate the same thing, 40 CFR § 125.3(d)(3)(v). By analogy, this also supports EPA's view regarding setting case-by-case § 316(b) limitations. Again, it seems clear to the Agency that this is the appropriate application of the law, and that the alternative—i.e., assessing costs at the national level—would make no sense in the context of the case-by-case application of § 316(b).

Finally, it should be noted that the *Chemical Manufacturers* case, and the legislative history cited therein, deals with the development of § 301 effluent discharge limitations on a national basis, rather than § 316(b) intake limits, and rather than case-by-case limits of any sort. Therefore, this case does not contradict EPA's analysis of these issues.

110. Comment

One commenter noted that in applying BPJ to determine BTA, EPA has broad discretion to conclude that closed-cycle cooling is widely available and economically achievable, even if costs are not completely (or partially) passed on to ratepayers. The commenter added that EPA is barred from complying with the permittee's request to directly compare costs and benefits of pollutant reduction in determining BTA, and that EPA must focus on considering the best technology available in light of the statutory goal to restore and maintain the physical and biological integrity of the nation's waters. (1133)

Response
Having considered the comments on the Draft Permit, EPA continues to conclude that the facts demonstrate that retrofitting an existing power plant with closed-cycle cooling using mechanical draft wet cooling towers is an “available” technology, and that cooling water intake structure capacity (or flow) limitations based on the use of this technology “reflect the best technology available for minimizing adverse environmental impact” from cooling water intake structures. 33 U.S.C. § 1326(b). EPA also continues to conclude that the facts demonstrate that implementation of this technology **at BPS** is technologically and economically achievable. EPA believes that these conclusions are borne out by its analyses in the July 22, 2002, Permit Determinations Document and elsewhere in this document, and that these conclusions have not been refuted by the public comments received.

EPA agrees that these conclusions are not altered by whether or not the permittee would be able to pass all or some of its compliance costs on to electric consumers. The ability or inability to pass on compliance costs is not a specific criterion for setting CWA technology standards. That being said, the fact is that while utilities in a regulated electricity market could generally recover such compliance costs by passing them on to consumers through electric rate hikes, this is not necessarily the case in the deregulated markets that now prevail in most of New England. Nevertheless, EPA has concluded that the relatively wide profit margins enjoyed by BPS in the New England market by virtue of its relatively cheap production costs mean that it can afford the costs of complying with the NPDES permit and still remain profitable. Again, this is discussed in more detail in the July 22, 2002, Permit Determinations Document and elsewhere in this document.

EPA agrees with the commenter that the Agency should make its CWA § 316(b) determinations consistent with, and in light of, the CWA’s overarching statutory purpose of restoring and maintaining the physical and biological integrity of the nation’s waters. EPA discussed this consideration in the July 22, 2002, Permit Determinations Document. At the same time, however, as EPA has also explained in the July 22, 2002, Permit Determinations Document and discussed elsewhere in this document, the Agency applies a “wholly disproportionate cost” test in setting CWA § 316(b) permit limitations. While this clearly does not require either a precise or strict cost-benefit analysis, it does require consideration of costs and some weighing of costs and benefits. This issue is discussed in more detail in the July 22, 2002, Permit Determinations Document and elsewhere in this document.

Response #: IV.111	**Document #**: 1133

Comment
One commenter stated that under CWA § 316(b) EPA should focus on benefits and harms to the environment rather than on the permittee’s ability or inability to pay for pollution abatement measures. This commenter further stated that cost should not be a key factor in setting requirements under § 316(b) and that EPA is obliged to select the “most effective means of minimizing adverse effects” with only a reasonable estimate of costs.

Response
EPA’s view of the role of cost considerations in setting intake limitations under CWA § 316(b) is set forth in Chapter 7 of the July 22, 2002, Permit Determinations Document and elsewhere in this document. EPA’s position is that only a reasonable estimate of costs is needed; a precise estimate is **not** required, and EPA applies a wholly disproportionate cost test that considers costs in relation to the benefits of a particular technology option. EPA has also interpreted CWA § 316(b) to require consideration of economic practicability, as discussed in the July 22, 2002, Permit Determinations Document and elsewhere in this document.

V. State Water Quality Standards-Related Issues

Response #V.1-8	**Document #**: 1218

1. Comment
PG&E-NEG stated that the Administrative Record does not indicate that EPA "formally established water quality-based limits in the draft permit or that such limits formed the basis for the final limits Region 1 selected." The permittee also states that EPA "has not placed in its Administrative Record the basis for its selection of water quality-based standards." The permittee also complained that there have been delays in its receipt of the complete State Administrative Record from the MA DEP and "[a]s a result, BPS reserves its right to submit comments on this aspect of the draft permit pending a meaningful opportunity to review the complete Administrative Record."

Response
This comment is responded to elsewhere in this document. In addition, the permit's thermal discharge limits were, and are, actually based on a CWA § 316(a) variance rather than on water quality standards. The permit's cooling water intake capacity limits are based on CWA § 316(b), though EPA has also determined that these limits cannot be made significantly less stringent due to state water quality requirements.

2. Comment
The permittee stated that if EPA decides to grant "alternative thermal limits under Section 316(a) . . . a state is not entitled to withhold certification or to insist on the application of limits more stringent than those determined under Section 316(a)." (FHE, Att. 4, p. 10, item 2)

Response
The Commonwealth of Massachusetts **has** certified EPA's NPDES permit for BPS under CWA § 401, including the permit's thermal discharge limitations developed under CWA § 316(a). Therefore, the legal issue posed by the permittee—i.e., that a § 316(a) thermal discharge variance "trumps" State certification requirements for thermal discharges—does not need to be addressed or resolved here.

While the above is sufficient for the BPS permit development process, EPA wishes to state that it does not agree that the legal issue addressed in the comment is clearly decided in the manner suggested by the permittee.

3. Comment
PG&E-NEG states that EPA is incorrect as a matter of law when the Agency "states that 'Congress clearly stated even for downstream affected states—which do not have direct certification authority . . . —if permit conditions cannot be developed to insure compliance with the downstream state's standards, then no permit may be issued.'" The permittee argues that EPA ignores the case of *Arkansas* v. *Oklahoma*, 503 U.S. 91, 111 (1992), which the permittee states "confirm[s] that downstream states do not have veto authority over discharges in other states." (FHE, p. 10, item 3)

Response
EPA believes that it has properly discussed and interpreted CWA § 401(a)(2) and that its reading is supported by the Supreme Court's interpretation of the provision in *Arkansas* v. *Oklahoma*, 503 U.S. 91 (1992). See also *In re City of Moscow, Idaho*, 2001 EPA App. LEXIS 12 (July 27, 2001) (NPDES Appeal No. 00-10), n. 58 and p. 76. See Chapter 5 of EPA's July 22, 2002, Permit Determinations Document and discussion elsewhere in this document. EPA also has not offered the downstream State in this case, Rhode Island, "veto" power over the permit.

4. Comment

PG&E-NEG stated that it disagrees with MA DEP's "proposed mixing zone," but is "reserving its detailed comments on the mixing zone proposal." The permittee gives several reasons for withholding its comments on the mixing zone. First, according to the permittee, the State's proposal "does not represent MADEP's final position as to the mixing zone that would actually be applied to BPS." The permittee also complained of delays in the State's providing "access to the [State's] administrative record supporting this proposal . . . [noting that a] portion of that record was made available to BPS less than a week before the comments were due and BPS has been notified that the remainder will not be available for some time." In addition, according to the permittee, EPA "has not chosen to rely on the MADEP recommendation as the basis for its [thermal discharge limit] proposal." The permittee stated that it "will submit its comments on the mixing zone proposal once it has been given a reasonable opportunity to review the administrative record on which it is based." (FHE, Att. 4, p. 32, item 1)

Response

EPA agrees that the permit's thermal discharge limits are not founded on the mixing zone-based water quality standards analysis prepared by MA DEP. The thermal discharge limits were, instead, based on a CWA § 316(a) variance. In addition, EPA recognizes that there is no requirement that a permittee provide comments on **any** aspect of a Draft NPDES Permit and the company is free not to file comments regarding the MA DEP's mixing zone analysis in this case.

EPA does not agree, however, that the permittee can necessarily provide comments later to EPA regarding that analysis. EPA provided a detailed explanation of its application of water quality standards in Chapters 5 and 8 of EPA's *Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from Brayton Point Station in Somerset, MA (July 22, 2002)* (EPA's July 22, 2002, Permit Determinations Document). In addition, MA DEP's mixing zone analysis was incorporated as Appendix A to the document. This provided a more than adequate basis for the permittee to comment to EPA during the public comment period regarding the water quality standards and the State's mixing zone analysis. Essentially, the only substantive comment provided by the permittee on this topic during the comment period, or since, is the unsupported, conclusory statement that it disagrees with the State's mixing zone.

With respect to the permittee's complaint that the State has not provided an adequate Administrative Record to the permittee regarding the mixing zone, that is a State law issue between the permittee and the State. For its part, EPA has provided an adequate record regarding the Federal permit and the permittee should have filed any comments it had on that record during the comment period.

5. Comment

The MA DEP, the RI DEM, the MA Division of Marine Fisheries (MA DMF), and the MA CZM Office all provided EPA with written comments and analyses in response to PG&E-NEG's Final CWA §§ 316(a) and (b) Demonstration Documents (December 2001). EPA attached the major submissions from the States as a group in Appendix B to EPA's Permit Determinations Document. PG&E-NEG has provided a number of comments on the submissions by the States.

Response

EPA appreciates that the permittee has provided comments on the various State submissions mentioned above, and the Agency has considered those comments. At the same time, EPA needs to respond only to comments on the basis for its Draft Permit. Therefore, although EPA has considered the permittee's comments regarding the various State documents, the Agency is not providing specific responses to each of these comments on analyses by the States. Instead, EPA is responding to comments on the basis for its permit. To the extent that EPA has based its permit on some aspect of one of the State analyses and the permittee has commented on that point, EPA has responded to it.

To the extent that the permittee wants direct responses to its specific comments on the States' analyses regardless of whether they are part of the basis of EPA's permit, the permittee should seek such responses from the relevant State agency. Because it was unclear from the permittee's submission as to whether it had sent its comments on the State documents to the relevant State agencies, EPA has forwarded these comments to the States for their consideration and response as they deem appropriate.

6. Comment

The permittee stated that for this permit, thermal discharge limits that would "otherwise" apply in the absence of limits based on a CWA § 316(a) variance are technology-based limits based on a the application of the BAT standard. Specifically, the permittee point to the 0.8 TBtu annual heat load limit and the 85 °F maximum temperature limit stated at pp. 8-2 to 8-3 of EPA's Permit Determination Document. The permittee further stated that there is no indication that EPA established any water quality standards-based limits. According to the permittee, although the MA DEP provided EPA with a potential mixing zone for thermal discharge limits, EPA did not use it to develop actual thermal discharge limits. PG&E-NEG argued that if EPA later tries to adopt this mixing zone as the basis for thermal discharge limits, EPA's Administrative Record does not identify "the basis for its selection of water quality-based standards." Moreover, PG&E-NEG stated that it had not yet been given the MA DEP's complete Administrative Record and that, therefore, it "reserves its rights" to submit additional comments on this aspect of the Draft Permit after "a meaningful opportunity to review the complete Administrative Record.

Response

In the absence of limits based on a CWA § 316(a) variance, the permit's thermal discharge limits would be based on the more stringent of the technology-based and water quality-based requirements in accordance with CWA § 301. See §§ 4.1, 4.2.1, 5.2, and 8.1 of *EPA's Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from BPS in Somerset, MA (July 22, 2002)* (EPA's July 22, 2002, Permit Determinations Document). The permittee is correct that EPA determined technology-based thermal discharge limits based on application of the BAT standard. See *Id*. at § 8.1.1. The permittee is incorrect, however, in stating that EPA did not identify permit conditions based on State water quality standards or a basis for such limits.

EPA **did** identify, and explain the basis for, permit limitations based on State water quality standards. These limitations were based on a mixing zone analysis by the Commonwealth of Massachusetts. Because the power plant's thermal discharge also affects Rhode Island's water quality, Massachusetts also coordinated with Rhode Island concerning the development of the mixing zone. This mixing zone evaluation is included as Appendix A to, and is discussed in Chapter 5 of, EPA's July 22, 2002, Permit Determinations Document. In addition, EPA identified thermal discharge permit requirements that would have been based on the Massachusetts mixing zone in Section 8.1.2 of EPA's July 22, 2002, Permit Determinations Document. As stated above, the technology- and water quality-based conditions would be combined so that in the event of any difference between the two sets of requirements, the more stringent aspect of each would apply.

The permittee also argued that if the permit was to include limits based on the State's mixing zone analysis, it reserves the right to file additional comments after a meaningful opportunity to review the complete administrative record from the State. EPA disagrees that the permittee is entitled to additional formal opportunity for public comment on the NPDES permit on this basis. First, the permit's thermal discharge limits are based on a CWA § 316(a) variance rather than the Massachusetts mixing zone. Second, even if EPA's thermal discharge limits had been based on the State's water quality standards, the permittee has had a more than adequate opportunity to comment on the basis of **EPA's** determination of State water quality-based limits for thermal discharges based on the application of Massachusetts' water quality standards. Third, if any water quality-based thermal discharge limits ended up being based on state water quality certification conditions, under applicable law those limits would need to be appealed to the State. Fourth, flaws in **the State's** administrative record, if any, do not constitute flaws in **EPA's** administrative record. Moreover, the permittee must address its concerns about the State's administrative record with the State (see AR 3021).

7. Comment
PG&E-NEG stated that CWA § 303(g) means that "alternative" thermal discharge limitations based on a CWA § 316(a) variance "would supplant any more stringent limitations on heat that might be imposed based on State water quality standards." The permittee further stated that a CWA § 316(a) variance would "displace state water quality standards." Citing p. 8-3 of EPA's Determinations Document, the permittee also stated that EPA does not appear to dispute this. The permittee complains, however, that the discussion of water quality standards in Chapter 5 of EPA's Permit Determinations Document contains "several misleading statements" regarding the role of Massachusetts', and Rhode Island's water quality standards in development of a permit for BPS. PG&E-NEG stated that it is "well established as a legal matter that, if alternative limits under Section 316(a) are granted, a state is not entitled to withhold certification, Determination, p. 5-5, or to insist on the application of limits more stringent than those determined under Section 316(a), Determination, p. 5-9."

Response
The permittee has argued at some length in its comments that where EPA proposes to issue an NPDES permit with thermal discharge limits based on a CWA § 316(a) variance, States have no authority based on State law requirements to deny certification or impose more stringent thermal discharge conditions in a § 401 certification. EPA has carefully considered the permittee's arguments and must disagree that the legal issue is "well established" in the manner asserted by the permittee. EPA understands the permittee's arguments but believes that a number of other arguments support a conclusion contrary to that urged by the permittee. Thus, EPA believes the answer to the question is unclear.

There is no need, however, to resolve this issue for the BPS permit; therefore, EPA declines to do so. This legal issue would require resolution for this permit only if the State were denying certification, or imposing more stringent certification conditions, so as to bar the thermal discharge limitations proposed by EPA on the basis of a § 316(a) variance. In this case, the State has taken neither of these actions. Instead, Massachusetts has certified the permit, including the § 316(a) variance-based thermal discharge limits, under CWA § 401(a)(1).

8. Comment
PG&E-NEG stated that a downstream State whose waters would be affected by a discharge is not authorized to "veto" an NPDES permit on the grounds that it believes the discharge will cause violations of its water quality standards.

Response
EPA agrees that CWA § 401(a)(2) does not authorize a "downstream state" to "veto" NPDES permits that it believes may cause a violation of its water quality standards. EPA never stated that it did. See § 5.2 of EPA's July 22, 2002, Permit Determinations Document. At the same time, however, Congress expressly dictates in CWA § 401(a)(2) that EPA may not issue, or allow an "upstream State" to issue, a permit allowing discharges resulting in violations of the downstream State's water quality standards. The statute also directs EPA to at least consider the views of the downstream State concerning whether the permit will result in violations of the State's standards. If EPA agrees that a permit would cause such violations, it cannot issue the permit until changes have been made that will correct the violations. If EPA disagrees, it would issue the permit, and the downstream State could decide whether to appeal the permit. The Supreme Court's decision in *Arkansas* v. *Oklahoma*, 503 US 91, at 111 (1992), is consistent with this understanding of the requirements of CWA § 401(a)(2).

Response #V.9-11	**Document #**: 1132, 1133, 1150, 1175

9. Comment
One commenter stated that under CWA § 401, in order for the permittee to receive a NPDES permit, (1)Massachusetts must issue a water quality certification, and (2) Rhode Island, as the downstream state, also may insist that its water quality standards are complied with. The commenter supported EPA's determination that only closed-cycle cooling for the entire facility would satisfy both states' standards. (1133)

Response
I. Introduction

The proper application of State water quality standards and other State law requirements to thermal discharge and cooling water intake limitations is complicated and was discussed in detail in Chapter 5 and §§ 6.2 and 7.2.9 of EPA's July 22, 2002, Permit Determinations Document. Nevertheless, further discussion is appropriate in response to comments.

As a general matter, the CWA requires NPDES permit limitations to be based on whichever is more stringent between Federal technology-based and State water quality standards-based (or other State law requirement-based) conditions. See, e.g., 33 U.S.C. § 1311(b)(1)(C). The CWA also generally allows State law requirements to be **more** stringent than the minimum Federal requirements. See, e.g., 33 U.S.C. § 1370.

II. State in Which the Permitted Facility is Located.

Turning first to the State in which the permitted facility is located, under the CWA § 401 Certification process, this State may require a federal permit to include limitations based on its water quality standards or other State law requirements. CWA § 401(a)(1) provides, in pertinent part, that:

> …[n]o license or permit shall be granted until the certification required by this section has been obtained or has been waived as provided in the preceding sentence. No license or permit shall be granted if certification has been denied by the State ….

33 U.S.C. § 1341(a)(1). In addition, CWA § 401(d) specifies that:

> [a]ny certification provided under this section shall set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that any application for a Federal license or permit will comply with any applicable effluent limitations and other limitations, under section 1311 or 1312 of this title… and with any other appropriate requirement of State law set forth in such certification, and shall become a condition on any Federal license or permit subject to the provisions of this section.

33 U.S.C. § 1341(d). Thus, the plain language of the statute indicates that EPA could not issue an NPDES permit in the face of a State denial of certification, and that an EPA NPDES permit must include any conditions required by the State's certification. See also 40 C.F.R. §§ 124.55(a)(1) and (2).

The State does not, however, **have to** issue a CWA § 401 certification. The statute plainly indicates that a State can also either "waive" or deny certification. 33 U.S.C. § 1341(a)(1). See also 40 CFR §§ 124.53(a). Regardless of what the State does, EPA has an independent obligation under CWA § 301(b)(1)(C) to ensure that the permit limits it issues satisfy any more stringent state requirement based on water quality standards or other applicable State law requirements. See also 40 CFR § 122.44(d)(5).

III. "Downstream Affected State"

Turning next to States other than the one in which the permitted facility is located, but whose water quality is nevertheless affected by the facility (i.e., a "downstream affected State"), such States do not have authority to issue (or deny) water quality certifications for permits issued under the CWA. **Compare** 33 U.S.C. § 1341(a)(1), **with** § 1341(a)(2). Instead, under CWA § 401(a)(2), a downstream affected State may assess the effect of the permit on its water quality, raise objections to the permit, and request a public hearing. 33 U.S.C. § 1341(a)(2). While the powers of the downstream affected state are limited in this manner, the statute nevertheless requires the permitting agency itself to "condition such license or permit in such manner as may be necessary to insure compliance with applicable water quality requirements [in the downstream affected state]." Id. Indeed, CWA § 401(a)(2) further states that "[i]f the imposition of conditions cannot insure such compliance such agency shall not issue such license or permit." Id. See also 40 CFR § 122.44(d)(4).

Thus, the downstream affected state cannot itself directly impose permit conditions based on its water quality requirements through the § 401 certification process. It can only make its views known and potentially request a hearing regarding the permit conditions necessary to ensure compliance with its water quality requirements. The permitting agency, however, is required to determine what permit limitations are necessary to satisfy the water quality requirements of the downstream affected State and to include such limitations in the permit. If the downstream affected State believes that the permit fails to include such requirements, then it may appeal the permit (like any other interested person with proper standing).

IV. State Water Quality Requirements and Cooling Water Intake-Related Limitations.

As EPA explained in some detail in the July 22, 2002, Permit Determinations Document, see §§ 7.2.9 and 5.2, the NPDES permit's requirements pertaining to CWISs under CWA § 316(b) must not only comply with EPA technology standard determinations, but also must comply with any more stringent, applicable State legal requirements, including water quality standards. See also 66 Fed. Reg. 65277 - 78 (Dec. 18, 2001) (EPA preamble for Final Phase I CWA § 316(b) Regulations).[1]

This is consistent with the terms of CWA §§ 510, 401, and 301(b)(1)(C) and the statutory purpose expressed in CWA §§ 101(a) and (b). These provisions indicate that Congress intended to preserve the States' authority to impose requirements more (but not less) stringent than federal technology standards if they so choose to protect their water quality. See, e.g., *PUD No. 1 of Jefferson County* v. *Washington Department of Ecology*, 511 U.S. 700, 705 (1994); *Arkansas* v. *Oklahoma*, 503 U.S. 91, 107 (1992).

To begin with, CWA § 101(a) declares that the CWA's objective is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters,'' while § 101(a)(2) states that to achieve this objective, "it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the

[1] Please note that EPA is well aware that the Phase I CWA § 316(b) regulations apply to "new facilities" and do **not** apply to BPS, which is an "existing facility." We are not suggesting that the requirements of the Phase I regulations actually apply to BPS. We only point to the legal analysis in the preamble to the Phase I regulations to show that it is consistent with the Region's conclusion that cooling water intake structure requirements must comply with any more stringent applicable State water quality requirement as well as minimum Federal technology standards.

water be achieved by July 1, 1983 . . . " This indicates that the protection of fish and other aquatic life was one of Congress's major goals in enacting the CWA.

CWA § 101(b) states that "[i]t is the policy of Congress to recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution [and] to plan the development and use (including restoration, preservation, and enhancement) of . . . water resources . . .'' 33 U.S.C. §§ 1251 (introductory paragraph), (a) (1) and (2), and (b). Furthermore, CWA § 510 provides, in pertinent part, that:

> [e]xcept as provided in this Chapter, nothing in this chapter shall (1) preclude or deny the right of any State or political subdivision thereof… to adopt or enforce (A) any standard or limitation respecting discharges of pollutants, or (B) any requirement respecting control or abatement of pollution; except that if an effluent limitation, or other limitation,… prohibition,… or standard of performance is in effect under this chapter, such State… may not adopt or enforce any effluent limitation, or other limitation,… or standard of performance which is less stringent than the effluent limitation, or other limitation,… prohibition,… or standard of performance under this chapter… .

This statutory provision clearly dictates that States are free to regulate pollution and associated effects and activities as they see fit, except that they cannot impose less stringent conditions than would be required by Federal law. The only exception, as indicated in the opening clause of § 510, would be if the CWA expressly provided that it preempted State law in a particular area. There is no such express preemption of State requirements that might be applicable to cooling water intake limitations. In other words, nothing in the statute purports to prohibit the application of State water quality requirements to cooling water intake permit limitations.

Moreover, CWA § 510 can be read to indicate **expressly** that State law requirements may address cooling water intake restrictions and be more stringent than federal requirements. While CWA § 510(1)(A) refers to effluent discharge limits, § 510(1)(B) refers to other types of requirements "respecting control or abatement of pollution." Later in the text, § 510 distinguishes an "effluent limitation" from an "other limitation, . . . prohibition, . . . or standard of performance." Cooling water intake limitations would fall within the category of other limitations, prohibitions, or standards of performance. Indeed, the Federal courts have expressly held that CWA § 316(b)-based cooling water intake limitations are "other limitations" under CWA §§ 301 and 306. *Virginia Elect. & Power Co.* v. *Costle*, 566 F.2d 446, 450 (4th Cir. 1977) ("we think a regulation implementing the requirements of § 316(b) must qualify as an 'other limitation' [under §§ 301 and 306]"); *Cronin* v. *Browner*, 898 F.Supp. 1052, 1058 (S.D.N.Y. 1995) ("regulation under section 316(b) constitutes the issuance of an 'other limitation' under sections 301 and 306"). See also PUD No. 1, 511 U.S. at 711-12 (Supreme Court concludes that minimum in-stream flow requirements are "other limitations" under the CWA). Thus, CWA § 510 can be read to indicate expressly that State law requirements may address cooling water intake restrictions and be more stringent than Federal requirements.

Consistent with this reading of the statute, the Supreme Court has also made clear that CWA § 401 applies to more than just "discharges" of pollutants. The Court explained in PUD No. 1, 511 U.S. at 711-12, that while there must be a "discharge" in order to trigger application of the State certification provisions of CWA § 401(a)(1), CWA § 401(d) and EPA regulations at 40 C.F.R. § 121.2(a)(3) authorize State certification conditions to be placed on the permit applicant's **activity as a whole** so as to ensure compliance with any applicable "effluent limitations and other limitations" under §§ 301, 302, 306 or

307, **and** any applicable water quality standard or other requirement of State law. See also 40 C.F.R. §§ 122.44(d), 124.53. The Court stated:

> The text of [CWA § 401(d)] refers to the compliance of the applicant, not the discharge. Section 401(d) thus allows the State to impose "other limitations" on the project in general to assure compliance with various provisions of the Clean Water Act and with "any other appropriate requirement of State law." … Section 401(a)(1) identifies the category of activities subject to certification – namely those with discharges. And § 401(d) is most reasonably read as authorizing additional conditions and limitations on the activity as a whole once the threshold condition, the existence of a discharge, is satisfied.

511 U.S. at 711-12. Thus, a permit issued to a facility with a discharge must include cooling water intake limitations that satisfy not only federal technology standards, but also any applicable State water quality standards or other State law requirements.

While the above discussion indicates that a Federal Draft Permit's cooling water intake limitations must satisfy any pertinent conditions in a State § 401 certification, EPA also has an independent obligation under CWA § 301(b)(1)(C) to ensure that the intake limits in an EPA-issued permit satisfy any applicable, more stringent State requirements even if the State does not specify cooling water intake limitations in its § 401 certification. CWA § 301(b)(1)(C) provides that permit limits must achieve:

> . . . not later than July 1, 1977, any more stringent limitation, including those necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations (under authority preserved by section 1370 of this title) or any other Federal law or regulation, or required to implement any applicable water quality standards established pursuant to this chapter.

33 U.S.C. § 1311(b)(1)(C).

Although the general heading of CWA § 301 is "Effluent Limitations," the language of § 301(b)(1)(C) is not limited strictly to effluent discharge limitations. The provision also uses the term "limitations" **without** the modifying term "effluent." This distinguishes CWA § 301(b)(1)(C) from other subsections of § 301. The provision also states that permit limits must satisfy State water quality standards or other State law requirements without limiting this requirement to "effluent limitations." Furthermore, as discussed above, CWA § 316(b) requirements have been held by the federal courts to be "other limitations" adopted under §§ 301 and 306. In addition, as also discussed above, the Supreme Court has made clear that water quality standards can address more than solely discharge conditions and be enforceable through the § 401 certification process. It would be anomalous for EPA to have an independent responsibility under § 301(b)(1)(C) to ensure that effluent-related Draft Permit conditions satisfy State standards, but not to have the same obligation to ensure that cooling water intake permit conditions satisfy applicable State standards. Cf. *Virginia Electric*, 566 F.2d at 450 ("the regulations issued under § 316(b) are so closely related to the effluent limitations and new source standards of performance of §§ 301 and 306 that we think it would be anomalous to have their review bifurcated between different courts").

Finally, with respect to State water quality requirements, the Supreme Court also made clear in PUD No. 1, 511 U.S. at 713-19, that narrative provisions related to designated uses that are included in a State's water quality standards may be enforced through permit conditions. Id. Therefore, cooling water intake limitations must satisfy these aspects of State water quality requirements, in addition to any applicable numeric criteria.

As discussed above, Rhode Island is a “downstream affected state” relative to BPS. As such, it does not have a certification role under § 401. Nevertheless, as also discussed above, CWA § 401(a)(2) dictates that EPA, as the permitting agency, must include permit conditions necessary to ensure compliance with applicable Rhode Island water quality requirements and may not issue the permit if the imposition of permit conditions will not ensure such compliance. 33 U.S.C. § 1341(a)(2). Therefore, EPA must make sure that the cooling water intake limitations in the BPS permit will ensure compliance with Rhode Island’s applicable water quality requirements.

As explained in § 5.2 of EPA’s July 22, 2002 Determinations Document, EPA **generally** defers to a State’s application or interpretation of its own water quality standards and other State law requirements. At the same time, however, EPA must meet its independent obligation to ensure that State requirements are satisfied as dictated by CWA §§ 301(b)(1)(C) and 401(a)(2). Therefore, EPA must independently assess the question as well as consider the State’s views on the subject.

V. Thermal Discharges, State Water Quality Requirements and CWA § 316(a) Variances.

EPA has interpreted CWA § 316(a) to authorize thermal discharge limitations based on a variance from both Federal technology standards and State water quality requirements. The interaction of CWA § 316(a) with the statute’s requirements for compliance with State water quality requirements is discussed in EPA’s July 22, 2002, Permit Determinations Document in Chapters 5 and 6, but more discussion is warranted in response to comments received on the Draft Permit.

The permittee has argued at some length in its comments that where EPA proposes to issue an NPDES permit with thermal discharge limits based on a CWA § 316(a) variance, States have no authority based on State law requirements to deny certification or impose more stringent thermal discharge conditions in § 401 certification. EPA has carefully considered the permittee’s arguments and disagrees that the issue is settled in the manner argued by the permittee. Indeed, the Agency believes a number of arguments tend to support a contrary conclusion. However, EPA has also concluded that there is no need to resolve this issue for the BPS permit and, therefore, it declines to do so. The bottom line in this case is that, as discussed below, there is no conflict between the CWA § 316(a) variance-based thermal discharge limits proposed by EPA and any State certification requirements under CWA § 401 because Massachusetts has issued a CWA § 401(a)(1) certification for the permit, including its § 316(a) variance-based limits.

Thus, while there are many points that could be made here regarding how to interpret the CWA and how to deal with the possible conflict between §§ 316(a), 401 and 510, EPA does not need to decide the question here because there is no conflict at hand. In the instant case, EPA has decided to issue a CWA § 316(a) variance, and Massachusetts has issued a CWA § 401 certification for the permit and has not proposed any more stringent thermal discharge conditions. Therefore, EPA can issue the permit in full compliance with CWA §§ 316(a), 401(a)(1) and 401(d). Moreover, the State of Rhode Island has not objected to the permit’s thermal discharge standards.

VI. Massachusetts Water Quality Standards Applied.

A. Thermal Discharge.

EPA has based its thermal discharge limitations on a CWA § 316(a) variance. These limitations supplant the more stringent limitations that would have otherwise applied based on applicable Federal technology standards and State water quality standards.

Before making its variance determination, EPA determined the thermal discharge limitations that would have applied under the applicable Federal technology standard (i.e., BAT) and applicable Massachusetts water quality standards. State water quality-based limitations must satisfy applicable designated uses and numeric and narrative criteria for the waterbody in question. In this case, EPA determined that water quality-based limits would have been based on the mixing zone analysis provided by the Commonwealth of Massachusetts and presented as Appendix A to EPA's July 22, 2002, Permit Determinations Document. The technology-based and water quality-based evaluations are discussed in Chapters 4 and 5 of EPA's July 22, 2002, Permit Determinations Document, respectively, as well as in Chapter 8 and elsewhere in this document.

It is apparent from this work that the thermal discharge limitations based on technology standards would have been fairly similar to those based on water quality standards. Both would have required substantial reductions in thermal discharge, and each was more stringent than the other under certain circumstances. Under CWA § 301, a permit is governed by whichever is the more stringent between technology-based and water quality-based limitations. Therefore, in the absence of a § 316(a) variance, permit limitations would have been designed based on both sets of requirements to ensure that the most stringent conditions would be satisfied at all times. It is worth noting that the water quality-based limitations derived from the State's mixing zone evaluation, consistent with the State's regulations and mixing zone policy, would have mandated **no thermal discharge** at certain times in order to ensure adequate zones of passage for migrating fish.

Ultimately, however, EPA determined that somewhat less stringent thermal discharge limitations could be imposed while still meeting the environmental standard of CWA § 316(a). In other words, EPA determined that somewhat less stringent thermal discharge limits "will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on . . . [the receiving] water." 33 U.S.C. § 1326(a). Therefore, EPA issued the Draft Permit with thermal discharge limitations based on a variance under CWA § 316(a) and issues the Final Permit on the same basis.

The relevant Massachusetts portions of the Mount Hope Bay estuary are either designated as SA or SB waters. Designated uses for the SA portions include providing "excellent habitat for fish, other aquatic life and wildlife" and a resource for "primary and secondary contact recreation," while designated uses for the SB portions include providing "a habitat for fish, other aquatic life and wildlife" and a resource for "primary and secondary contact recreation." 314 CMR 4.05(4)(a) and (b). Permit limitations subject to these standards must protect these designated uses. 314 CMR 4.05(1).[2]

The State's water quality standards also impose various numeric temperature criteria for both SA and SB waters. 314 CMR 4.05(4)(a)(2)(a.) and 4.05(4)(b)(2)(a). However, the standards for both SA and SB waters further provide that "any determinations concerning thermal discharge limitations in accordance with 33 U.S.C. 1251 § 316(a) will be considered site-specific limitations in compliance with 314 CMR 4.00." 314 CMR 4.05(4)(a)(2)(c) and 4.05(4)(b)(2)(c).

Under its CWA § 401(a)(1) certification review, the MA DEP reviewed and evaluated EPA's proposed NPDES permit and the various determinations that support it, including the CWA § 316(a) variance determination. MA DEP has concurred with EPA's CWA § 316(a) variance determination and, therefore, has certified the permit under CWA § 401(a)(1) as satisfying State requirements. The State's certification does not impose any conditions more stringent than or otherwise inconsistent with the proposed permit's thermal discharge conditions. See September 24, 2003, MA DEP CWA § 401(a)(1) Certification Letter. Based on EPA's own analysis and its consideration of MA DEP's water quality analysis, EPA agrees with

[2] The designated use for primary and secondary contact recreation includes recreational fishing.

MA DEP's conclusions. Therefore, EPA concludes that the permit's thermal discharge limits comply not only with the requirements of CWA § 316(a), but also with any applicable requirements of CWA §§ 401(a)(1), 401(d) and 301(b)(1)(C).

B. Cooling Water Intake Requirements.

As discussed in Chapters 7 and 8 of EPA's July 22, 2002, Permit Determinations Document and elsewhere in this document, EPA has developed cooling water intake limitations that the Agency has determined satisfy CWA § 316(b). As discussed in § 7.2.9 and Appendix A (cover letter) of EPA's July 22, 2002, Permit Determinations Document and above, the permit's cooling water intake limitations also must satisfy Massachusetts water quality standards, including designated uses. See also Chapter 5 and Appendix A of EPA's July 22, 2002, Permit Determinations Document and 314 CMR 4.05(1).

The Massachusetts portions of the Mount Hope Bay estuary affected by the adverse environmental impact of BPS's cooling water intake structures are classified as either SA or SB waters. As discussed above, under the Massachusetts water quality standards SA waters are, among other things, "designated as an excellent habitat for fish, other aquatic life and wildlife and for primary and secondary contact recreation," while SB waters are, among other things, "designated as a habitat for fish, other aquatic life and wildlife and for primary and secondary contact recreation." 314 CMR 4.05(4)(a) and (b).

EPA draws three conclusions related to permit conditions for the BPS cooling water intake structures and the consistency of these conditions with Massachusetts water quality standards. First, EPA concludes that the designated uses for fish habitat and recreational fishing for the Massachusetts SA and SB portions of the Mount Hope Bay estuary (including the Lee and Taunton Rivers) are not currently being attained owing in part to entrainment and impingement of organisms by BPS's withdrawals of water from the estuary for cooling.[3] Second, EPA concludes that the cooling water intake limitations proposed in the new NPDES permit for BPS will remove the plant's interference with the attainment of the SA and SB designated uses for the source waters of the Mount Hope Bay estuary. Third, EPA determines that any significantly less stringent intake limitations **would** likely interfere with attaining these uses and, therefore, the Agency cannot issue a permit with significantly less stringent intake limits as a matter of State water quality requirements under CWA § 301(b)(1)(C). These three conclusions are discussed below.

EPA concludes based on current information that the existing intake-related permit conditions for BPS do not comply with Massachusetts water quality standards. Under the facts of this case, it is inconsistent with providing either "excellent" fish habitat (SA waters) or an otherwise healthful "fish habitat"[4] (SB waters) to have a CWIS located in the waterbody that withdraws and kills trillions of organisms–including fish eggs, fish larvae, and juvenile and adult fish–from the waterbody. This is so when the entrainment and impingement losses are contributing to the much diminished, unhealthful state of the overall community

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[3] As discussed above, EPA recognizes that some recreational fishing presently occurs in the Massachusetts portions of Mount Hope Bay. However, the State has had to impose strict fishing restrictions for some species due to depleted fish populations. Entrainment and impingement of organisms by the BPS cooling water intake structures has contributed to the depletion of these populations and the resulting need to restrict recreational fishing.

[4] EPA recognizes that the Massachusetts SB standards refer to the designated use as provision of "a fish habitat" and do not expressly state that the habitat must be healthful. EPA also recognizes that the language of the SB standard is distinct from the SA standard which refers to "excellent fish habitat." Nevertheless, the Agency concludes it to be a proper interpretation of the State's standards that the SB fish habitat must be healthful and of at least somewhat high quality given the provisions of 314 CMR 4.01(4) and 314 CMR 4.05(1) and given the terms of the State's water quality analysis in Appendix A of EPA's July 22, 2002, Permit Determinations Document.

of organisms in the waterbody and these losses remove a significant percentage of the local populations of certain species of fish (e.g., winter flounder).

EPA notes that when fish are taken from the bay for fishing, it is generally compatible with the designated use because the resource is supposed to be managed to provide the beneficial use of fishing. Losing important numbers of the organisms for power plant cooling, however, is not compatible with the designated beneficial uses of the resource, at least under the facts of this case. See 314 CMR 4.05(1) ("Surface waters . . . shall be regulated to protect and enhance the designated uses."); 314 CMR 4.01(4). Fishing has had to be severely restricted in Mount Hope Bay because of depressed fish populations, and it is important from a water quality standards perspective to try to design a permit that will help enhance the resource's availability for fishing once more. In this regard, EPA again notes that steps are being taken to address other issues that might also be affecting Mount Hope Bay's ecology, ranging from the imposition of fishing restrictions to the improved control of water pollution discharges from the City of Fall River.

EPA concludes that the cooling water intake limitations proposed in the NPDES permit for BPS will satisfy the SA and SB designated uses for the source waters of the Mount Hope Bay estuary. There are several reasons for this conclusion. The permit limits will reduce intake flow by approximately 96 percent, and this will reduce the entrainment and impingement of aquatic organisms by the BPS CWIS by approximately the same percentage. Some commenters have complained that the intake flow of 56 MGD that is associated with the technology-based intake limits is still substantial and will result in a significant percentage loss of the Mount Hope Bay winter flounder population (approximately 26 percent) and other species. EPA agrees that this loss is significant and that if sustained on a continuous basis, it might well be inconsistent with meeting the State's designated uses for Mount Hope Bay. EPA believes, however, that the reductions in entrainment and impingement required by the new intake limits in the permit (along with other steps such as permit-mandated thermal discharge reductions and fishing restrictions) will help facilitate a recovery of the bay's winter flounder populations and its overall biological community. As this recovery develops, the percentage of the winter flounder population being lost to the intake will decline substantially. Obviously, EPA's assessment in this regard will need to be revisited in future permit renewals.

Another factor considered by EPA is that under the new permit, the power plant would use only the intake on the Lee River under most conditions. Although the Lee River side of the bay is designated SA whereas the Taunton River side of the bay (where the other BPS intake is located) is designated SB, EPA concludes the stated approach makes environmental sense. This is because it appears that the Taunton River intake might pose a relatively greater threat to winter flounder. Unfortunately both intakes impact spawning/nursery areas for winter flounder, but the Taunton River intake appears to be more of a threat. This is because one of the few sampling sites that has yielded winter flounder in recent years is located in the relatively deep water (for the Mount Hope Bay estuary) in the Taunton River channel near the intake. This appears to have resulted in the Taunton River intake impinging more winter flounder than the Lee River intake. The Taunton River also has among the largest anadromous fish runs in the Commonwealth, so removing the threat to anadromous fish from the intake should be positive for fish habitat quality.

In addition, the Taunton River intake has been the site of numerous "unusual fish impingement events" in recent years. While it is not clear why these events have been occurring with greater regularity at this intake, two possible theories involve factors peculiar to the Taunton River intake. One has to do with the shape of the coastline as it moves away from the point and cuts in toward the intake, while the other has to do with a possible effect of the large vessels that transit the Taunton River channel and unload coal at BPS. The idea is that one or both of these factors may have a tendency to direct fish toward the intake. Once they get too close, they cannot escape and are impinged. If either of these factors are contributing to these impingement events, then discontinuing use of the Taunton River intake would improve habitat quality. Finally, as has been noted previously, the Lee River intake was constructed more recently and uses angled traveling screens as opposed to flush-mounted screens. Angled traveling screens reputedly tend to impinge fewer fish, though there has been some dispute about this in the record.

Finally, EPA also concludes that any significantly less stringent intake limitations would not comply with the designated uses under the applicable Massachusetts water quality standards and, therefore, may not be issued as a matter of State water quality requirements under CWA § 301(b)(1)(C). EPA acknowledges that some **small** changes might be possible without running afoul of the State's water quality standards, but EPA believes that any significant increase to intake flow would not be acceptable. This is because significantly greater intake flow would result in degraded habitat quality since significantly greater numbers of marine organisms would be killed or injured by entrainment and impingement by the power plant's cooling water intake. In addition, EPA believes that such losses would prevent, significantly delay, or interfere with the recovery of local fish populations. EPA concludes that permit conditions that caused or contributed to such a result would be inconsistent with the State's water quality standards. Thus, while the permit's limits are based on Federal technology standards under CWA § 316(b), EPA believes that these limits could not be made significantly less stringent as a matter of State water quality requirements.

As mentioned above, the MA DEP has certified the conditions of the new NPDES permit for BPS and has not added any additional more stringent permit conditions. MA DEP's certification states that the permit's cooling water intake limitations adequately address entrainment and impingement impacts and will allow for the attainment of the designated uses of Mount Hope Bay in the State's water quality standards. Therefore, EPA has determined that the permit's intake limitations comply with CWA §§316(b), 401(a)(1), 401(d) and 301(b)(1)(C).

VII. Rhode Island Water Quality Standards Applied.

EPA discusses the need to consider Rhode Island water quality standards under CWA § 401(a)(2) in § 5.4 of EPA's July 22, 2002, Permit Determinations Document. Because EPA determined that this permit might affect Rhode Island's water quality, EPA sent the RI DEM a notice letter regarding the Draft Permit in accordance with § 401(a)(2). See EPA's July 22, 2002, Permit Determinations Document, § 5.4; AR 719. RI DEM responded to EPA in a letter dated September 18, 2002 (AR 1152), which addresses both thermal discharge and cooling water intake permit requirements.

A. Thermal Discharge.

Rhode Island's water quality standards set designated uses and narrative and numeric criteria for the Rhode Island portions of Mount Hope Bay that are relevant to the regulation of thermal discharges. See Rhode Island Water Quality Regulations, Rules 8.A., 8.B(2), 8.D.1, and 8.D.3. In RI DEM's September 18, 2002, letter (AR 1152), the State concluded that the thermal discharge allowed by the Draft Permit **would** cause a violation of applicable numeric water quality criteria for temperature and temperature change during the periods that the permit allows the facility to operate in a once-through cooling mode (i.e., during the 122 hours of once-through operations proposed by the Draft Permit).

Of course, the thermal discharge limitations in EPA's permit are based on a CWA § 316(a) variance. As explained above, EPA presently interprets CWA § 316(a) to authorize a variance from State water quality standards-based limitations, as well as technology-based standards. EPA believes that this applies not only to the standards of the State in which the discharging facility is located, but also to a "downstream affected State" such as, in this case, Rhode Island. There is also no requirement that EPA obtain a certification of the permit from the downstream State before issuing the permit, and that State cannot prohibit issuance of the permit or veto it (though it may appeal a permit like any other interested party).

Because EPA has concluded that the thermal discharge limitations satisfy the conditions of CWA § 316(a), the Agency has concluded that it may issue the permit despite the problem noted by the State. EPA further notes, however, that the RI DEM accepts EPA's determination under § 316(a) since it states in its letter that, "[h]aving reviewed all available information, . . . the Rhode Island DEM does not object to the issuance of the permit with the proposed CWA Section 316(a) . . . variance." AR 1152. The State goes on to "request that EPA consider" several potential additional limitations or restrictions on the conditions under which BPS would be permitted to use the 122 hours of once-through cooling operations. EPA has considered the State's proposals and has agreed to add the restriction that such once-through cooling is precluded during the winter flounder spawning season. This is more of a cooling water intake issue, however, rather than a thermal discharge issue. EPA decided not to add the other requirements that are geared toward additional thermal discharge restrictions on the grounds that we believe the thermal discharge limitations as designed should satisfy the standard of CWA § 316(a), and that the relatively small number of temporary, intermittent once-through cooling hours being allowed should not change that result.

B. Cooling Water Intake Requirements.

Rhode Island's water quality standards also apply to the NPDES permit's cooling water intake limitations. Specifically, the designated uses and narrative criteria for SA and SB waters apply because the BPS intake affects Rhode Island waters in Mount Hope Bay and Narragansett Bay that are subject to those classifications. See AR 1152 and Rhode Island Water Quality Regulations, Rules 6, 8.A, 8.B, 8.D, and 9.A. See also *Id.* Rules 1 and 4. EPA previously determined that the cooling water intake limitations proposed in the Draft Permit for BPS would satisfy the technology standards in CWA § 316(b), see EPA July 22, 2002, Permit Determinations Document at Ch. 7 and 8, and would also likely satisfy Rhode Island's water quality standards. See Id. at § 7.2.9 and AR 719 (July 15, 2002, EPA letter to RI DEM).

In its September 18, 2002, letter, however, the State concluded that the entrainment and impingement that would occur during the 122 hours of once-through cooling operations allowed by the permit would "violate the general criteria for the protection of aquatic life specified in Rule 8.D.1." See also Rhode Island Water Quality Regulations, Rule 9.A. Nevertheless, the RI DEM also stated in its letter that "[h]aving reviewed all available information, . . . the Rhode Island DEM does not object to the issuance of the permit with the proposed CWA Section . . . 316(b) variance." AR 1152. The State then went on to "request that EPA consider . . ." several potential additional limitations or restrictions on the conditions under which BPS would be permitted to utilize the 122 hours of thermal discharges on a once-through cooling basis.

At the outset, EPA wishes to clarify that unlike CWA § 316(a), CWA § 316(b) is not a "variance" provision and does not authorize a "variance" from State requirements. Nevertheless, the State indicated that, in light of all the information before it, the State did not object to the permit but, instead, asked that EPA consider certain additional permit conditions. EPA has considered the State's proposals and, showing appropriate deference to the State's interpretation of its own standards, it has decided to adopt the State's suggestion that the permit prohibit any once-through cooling operations during the winter flounder spawning season (February through May). Among the conditions suggested by the State, this is the one that the Agency felt would most significantly further minimize the adverse environmental impacts of the BPS cooling water intake to meet State water quality standards. With this additional restriction, EPA concludes that the permit's intake limitations will satisfy not only CWA § 316(b), but also Rhode Island's water quality standards and CWA §§ 401(a)(2) and 301(b)(1)(C).

10. Comment

One commenter noted that EPA must apply Rhode Island water quality standards to its 316(b) determination and that the RI DEM has determined that the reductions in flow proposed in the Draft

Permit are the "minimum necessary" to ensure the protection of aquatic life. The commenter pointed out that Rhode Island water quality standards provide that any activity must not "adversely affect" the propagation or the composition of fish and wildlife and must also give specific protection to habitat integrity. (1133)

Response
These comments are addressed above and elsewhere in this document.

11. Comment
One commenter pointed out that Mount Hope Bay is a resource "held in trust for the benefit of the public" and governed by both Federal and State law. The commenter noted that EPA is "obligated to prevent further degradation of this resource" and to confirm the Draft Permit limits it established under 316(a) and (b) to meet Rhode Island and Massachusetts water quality standards. (1133)

Response
While EPA generally agrees with the commenter that the estuarine ecosystem of Mount Hope Bay is a natural resource held in trust by the Federal and State governments on behalf of the public, EPA also believes that its NPDES permit decision regarding BPS is governed by application of the Federal CWA. As discussed in EPA's July 22, 2002, Permit Determinations Document as well as in this document, EPA believes its permit determinations in this case comply with the CWA and, therefore, satisfy its legal obligation with respect to protecting Mount Hope Bay. With respect to State water quality standards specifically, EPA has discussed above the manner in which water quality standards apply to thermal discharge and cooling water intake requirements in this permit.

VI. Other Permit Limits

Response # VI.1	**Document #**: 1159

Comment
One commenter is seeking clarification on the duration of the quahog sampling and believes that quahogs close to the facility should be analyzed for polycyclic aromatic hydrocarbons (PAHs) to determine whether the coal pile is contributing to contamination in the bay.

Response
Historically, the sampling of quahog tissue has been done only for heavy metals. There was a concern that heavy metals could be leaching from the cooling water tubing into the environment at low concentrations but resulting in a significant mass flux of chemicals. Shellfish are excellent organisms to sample for bioaccumulation studies because they filter large quantities of water and often accumulate chemicals that are present below detectable concentrations in the water column. Sample stations were originally placed to determine the contribution of heavy metals from cooling water, and no consideration was given to the contribution of PAHs from the coal pile.

Sediments have been tested for PAHs as a result of proposed dredging projects for various parts of Mount Hope Bay. EPA will review the results of these tests and with these data in hand will be able to determine whether PAHs are elevated in Mount Hope Bay and whether additional monitoring may be required.

Response # VI.2	**Document #**: 1220, 1225

Comment
EPA received two comments expressing concern over the impact of the discharge of chlorine on fish stocks in Mount Hope Bay.

Response
Chlorine has been used by BPS as a control for biofouling, although its use has been carefully regulated by the limits set in the plant's discharge permit. EPA and Massachusetts derived discharge limits based on EPA's water quality criteria for chlorine and available initial dilution in the receiving water. Brayton Point's current discharge limit for total residual oxidants is a daily maximum concentration of 0.065 mg/l. Recently, BPS has begun a biofouling program that relies more on a physical means of cleaning called SIDTEC, thus reducing its use of chlorine dramatically. The average monthly limit for chlorine in the Draft Permit is 0.0375 mg/l, with a daily maximum of 0.065 mg/l. Since the beginning of the use of the SIDTEC cleaning system, BPS has reduced its chlorine use by 50 percent in the winter months and 11 percent on an annual basis.

Response # VI.3-28	**Document #**: 1218

Timing Issues

3. Comment
The permittee stated that the Draft Permit does not take into account the time necessary for BPS to construct cooling towers to implement Region 1's proposed new permit conditions. The permittee stated that the minimum amount of time necessary to retrofit the entire station is 4 years (citing *2001 Demonstration,* Appendix H, section 3). The permittee stated that although it does not agree that a retrofit of the entire station is appropriate, if Region 1 continues to advocate for an entire station retrofit, the Draft Permit should be clear that during the time of construction and start-up of the new equipment, the

terms of the existing 1993 permit (as modified by MOA II) would continue to govern operations at BPS. Similarly, the permittee stated that although it does not agree that the proposed reconfiguration of the wastewater treatment system is appropriate, if the system is to be reconfigured, the permit must provide a reasonable compliance schedule and the terms of the 1993 permit should remain in effect until construction and start-up are complete.

Response

The permittee is incorrect in stating that the terms of the 1993 existing permit, as modified by MOA II, should continue to govern operations at BPS until it has completed construction of the technologies necessary to comply with the new permit. The conditions in this Final Permit will be effective 60 days after issuance. Therefore, a compliance schedule will be needed. Since it is not appropriate to include such a schedule in the permit itself, EPA expects to include a compliance schedule in an administrative compliance order issued under CWA § 309(a). The Agency has authority to issue a compliance order under CWA § 309(a) either unilaterally or after negotiating a schedule with the permittee. EPA expects to try to negotiate a schedule with BPS.

The permittee's comment regarding wastewater treatment system reconfiguration is addressed elsewhere in this response to comments.

Wastewater Treatment System Issues (Outfall No. 004)

4. Comment

The permittee stated that the maximum daily flow rate of 1.0 MGD in § A.7 of the Draft Permit is too low. The permittee stated that Region 1 apparently misread information in a supplemental water balance diagram submitted by BPS to Region 1 on December 21, 2001, and therefore appears to have made a mistake in setting this limit. The permittee stated that the appropriate maximum daily flow limit is 4.0 MGD, which is the current permit limit for maximum daily flow as well as the design flow rate for the system. The permittee further stated that historically there have been no upsets of the wastewater treatment system attributable to too much flow, the flows from Outfall No. 004 have typically ranged from 0 MGD to 2.5 MGD, and additional flow will likely be necessary to handle the discharge from the air pollution control equipment soon to be installed.

Response

EPA agrees with the comment and will replace the maximum daily flow limit and the average monthly limit with limits of 4.0 MGD and 2.0 MGD, respectively. EPA has also changed the average monthly flow and maximum daily flow limits at Outfall No. 001 to 40 MGD and 42 MGD, respectively, to account for this increase in flow.

5. Comment

The permittee stated that the Draft Permit should not require separate wastewater treatment systems for metal-cleaning waste streams and low-volume waste streams because these wastewater streams are similar in composition and concentration. The permittee stated that (1) all the wastes entering the treatment system require the same extent of treatment, so it is inefficient to establish separate waste treatment systems, and (2) as the Draft Permit is written, all waste streams other than metal-cleaning wastes would not be treated at all, so the advantage of combining all the streams is that all waste streams are treated. The permittee stated that the effluent limitations for Outfall No. 004 set forth in §§ A.6 and A.7 of the Draft Permit are acceptable and should be applied to all the wastes handled in the wastewater treatment system. In addition, the permittee stated, the sampling schedule of the wastewater treatment should remain the same as the current permit with daily samples collected when metal-cleaning wastes are being discharged and weekly samples collected during "normal" operations or when there are no metal-cleaning wastes.

Response
EPA disagrees that the Draft Permit requires separate treatment of metal-cleaning wastes and other low-volume waste streams. Section A.6 states, in part, "During the period beginning the effective date ..., the permittee is authorized to discharge from **outfall serial number 004:** the **combined treated waste stream of metal cleaning wastes and low volume waste streams**" (emphasis added).

During the development of the Draft Permit, EPA reviewed the existing permit conditions and, based on that review, determined that it would be possible to meet the existing metal limits primarily through dilution, rather than treatment, which would be improper. This determination was made in the absence of metal composition and concentration data for the other waste streams entering the wastewater treatment facility (WWTF), i.e., EPA assumed that these waste streams contained no metal constituents. EPA then developed mass-based limits for copper and iron using the flow from the metal-cleaning waste, multiplied by the effluent guideline limits for metal-cleaning wastes (1.0 mg/l for both maximum daily and average monthly, per the permit). This approach addressed the concerns regarding dilution because the limit was mass-based rather than concentration-based.

The facility has now submitted information indicating that other waste streams entering the WWTF contain metals, such as copper and iron, that are similar in concentration and composition to the metal-cleaning waste stream. Therefore, EPA agrees that the copper and iron limits as established in the Draft Permit were developed inaccurately.

On page 99 of the comments submitted by the company, the permittee states that "[t]he effluent limitations for Outfall No. 004 set forth in §§ A.6 and A.7 of the Draft Permit are acceptable and should be applied to all of the wastes handled in the wastewater treatment system." This statement is in apparent conflict with both the comments contained in this section and the comment requesting that the copper and iron limits should be effluent-based, not mass-based. EPA requested clarification from the commenter through at least one telephone conversation and also during a July 22, 2003, visit to the facility. EPA understands this comment to mean that some consideration of mass of copper and iron should be applied to the other low-volume waste streams entering the WWTF, and that it would be acceptable to apply 0.33 lb to each waste stream and then sum the totals for an overall limit at the sampling point at Outfall No. 004.

The permittee suggests, in the next comment, that this limit should be expressed on a concentration basis rather than a mass basis.

EPA agrees that the contribution of copper and iron from the low-volume waste streams should be taken into account but disagrees that a mass of 0.33 lb should be applied to each stream. EPA addresses this issue below.

EPA agrees with the commenter that the sampling schedule for the wastewater treatment should remain the same as that in the current permit, with daily samples collected when metal-cleaning wastes are being discharged and weekly samples collected during "normal" operations or when there are no metal-cleaning wastes. The Final Permit has been changed to address this comment.

EPA agrees with the commenter that "Metal cleaning waste and low volume wastes should all be treated together, not separately and to the same high standard ... ." The limits in the Final Permit are consistent with this position.

6. Comment

The permittee stated that the copper and iron limits should be effluent-based, not mass-based, limits. The permittee stated that Region 1 incorrectly derived the copper and iron limits from the annual average flow rates (citing Fact Sheet §§ 4.5.6, 4.5.7), and that the limits should instead be determined by the daily maximum flow value. The permittee stated that under the circumstances, however, a mass limit is not appropriate. The permittee stated that the effluent flow from the wastewater treatment system varies considerably on a day-to-day basis, cannot be easily controlled, and is influenced to a large extent by factors outside BPS's control, such as timing and amount of rainfall. Therefore, the permittee stated, it is more appropriate to set the copper and iron limits on a concentration basis rather than on a mass basis. The permittee stated that these limits should be 1.0 ppm for both copper and iron under enhanced multi-mode, as stated in the effluent limitation guidelines at 40 CFR part 423.

Response

40 CFR Part 423 states that effluent limits for metal-cleaning wastes should be expressed as mass-based limits but allows EPA to use its discretion to set concentration-based limits if warranted.

As explained above, EPA set mass-based limits on the assumption that any copper or iron being discharged from Outfall No. 004 was due to metal-cleaning operations. EPA now understands this to be an invalid assumption because the company has provided information indicating that this is not the case. EPA now agrees that it is acceptable to set concentration-based limits. Therefore, EPA has determined, using best professional judgment, that it is appropriate to set maximum daily and average monthly limits of 1.0 mg/l for both copper and iron for all low-volume waste streams at Outfall No. 004. This limit applies after treatment and is based on information submitted by the company and the treatment removal efficiency of the WWTF.

The permittee states that these limits should be applied "... under enhanced multi-mode, as stated in the effluent limitations guidelines at 40 CFR Part 423." EPA notes that the effluent guidelines do not mention enhanced multi-mode. The limits apply equally under enhanced multi-mode or entire station closed-cycle.

CWA § 301(b)(1)(C) provides that permit limits must achieve

> not later than July 1, 1977, any more stringent limitations, including those necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations (under authority preserved by section 1370 of this title) or any other Federal law or regulation, or required to implement any applicable water quality standards established pursuant to this chapter.

Therefore, a comparison of technology-based versus water-quality based limits must be performed, and the more stringent limit must be applied.

Technology-based limit for Outfall No. 004:

Copper and Iron

1.0 mg/l daily maximum (acute)
Convert to mass = LIMIT x FLOW x CONVERSION FACTOR
= 1.0 mg/l x 4.0 MGD x 8.34 (lb/MG)/(mg/l)
= 33.36 lb/day

1.0 mg/l monthly average (chronic)
Convert to mass = LIMIT x FLOW x CONVERSION FACTOR
= 1.0 mg/l x 2.0 MGD x 8.34 (lb/MG)/(mg/l)

= 16.68 lb/day

Water quality-based limit for Outfall No. 001:

Copper

Massachusetts acute water-quality standard = 0.00578 mg/l
Convert to mass = STANDARD x FLOW x CONVERSION FACTOR
= 0.00578 mg/l x 42 MGD x 8.34 (lb/MG)/(mg/l)
= 2.02 lb/day

LIMIT = STANDARD x DILUTION
= 2.02 lb/day x 5
= 10.1 lb/day

Massachusetts chronic water-quality standard = 0.0037 mg/l

Convert to mass = STANDARD x FLOW x CONVERSION FACTOR
= 0.0037 mg/l x 40 MGD x 8.34 (lb/MG)/(mg/l)
= 1.23 lb/day

LIMIT = STANDARD x DILUTION
= 1.23 lb/day x 5
= 6.15 lb/day

The table below compares the results of the copper analysis.

Limit	Acute (lb/day)	Chronic (lb/day, 30-day average)
Technology-based	33.36	16.68
Water quality-based	10.10	6.15

As the above analysis demonstrates, the water quality-based derived limits are more stringent than the technology-based limits, and therefore EPA must apply the more stringent limit. The Final Permit limits for copper at Outfall No. 001, expressed in concentration, are

10.10 lb/day ÷ (42 MGD x 8.34 (lb/MG)/(mg/l)) = **0.0289 mg/l for acute** (daily maximum)

and

6.15 lb/day ÷ (40 MGD x 8.34 (lb/MG)/(mg/l)) = **0.0184 mg/l for chronic** (monthly average).

Because there are no marine water quality standards for iron, the effluent guideline limit of 1.0 mg/l for both maximum daily and average monthly will be used. The limit applies to Outfall No. 004 before it mixes with any other waste stream(s).

7. Comment

The permittee stated that Region 1 should eliminate from §§ A.6 and A.7, footnote 2, of the Draft Permit the requirement to report the influent of metal-cleaning wastes. The permittee stated that Region 1 needs information concerning the effluent from the wastewater treatment system, which will be reported in the monthly discharge monitoring report as required. The permittee stated that the influent reporting requirement, on the other hand, is not needed to demonstrate compliance and does not supply meaningful information to Region 1.

Response

EPA agrees that reporting of influent metal-cleaning waste volume is not necessary. Footnote 2 in §§ A.6 and A.7 has been changed, and this requirement has been eliminated from the Final Permit.

8. Comment

The permittee stated that Region 1 should clarify requirements in §§ A.6 and A.7 of the Draft Permit concerning pH, oil, and grease discharges that are inconsistent with §§ 4.5.2 and 4.3.2 of the Fact Sheet. The permittee stated that it assumed the permit supercedes the Fact Sheet, but requested Region 1 confirmation.

Response

The steam electric effluent guidelines set a pH range of 6.0–9.0 for all discharges, except once-through cooling water. Therefore, this limit was placed in the Draft Permit and is meant to apply to internal Outfall No. 004, prior to mixing with other waste streams.

Because the facility will no longer employ once-through cooling water, the pH limits of 6.0–9.0 found in the effluent guidelines apply to every waste stream at BPS, thereby eliminating the need to measure pH at internal outfalls. That is, the pH limit could be applied to the "end of the pipe" just prior to discharge to the receiving water.

Section 4.5.2 of the Fact Sheet describes the pH limit as it applies to the point source (Outfall No. 001) prior to entering Massachusetts waters (see § A.4.a. of the Draft Permit). The Massachusetts Surface Water Quality Standards require that the pH range be between 6.5 and 8.5 for point sources discharging into marine waters.

Therefore, the more stringent pH limit of 6.5–8.5 applies to the end of the pipe, and the need to measure internal waste streams for pH is unnecessary. EPA has removed the pH monitoring requirement from internal Outfall No. 004 from the Final Permit. Compliance with the pH limit will be determined at Outfall No. 001 before the waste stream enters the receiving water.

EPA agrees that the Fact Sheet contains typographical errors in references to the oil and grease limits. The second to last sentence in § 4.3.2 of the Fact Sheet should read: "The limits for TSS are 100 mg/l maximum for any one day and 30 mg/l for an average monthly (30 consecutive days), and the limits for oil and grease are 20 mg/l maximum for any one day and 15 mg/l for an average monthly (30 consecutive days)."

Section 4.5.5 of the Fact Sheet states that "[t]he limits in the draft permit for oil and grease are 20 mg/l maximum daily and 15 mg/l average monthly. The limits apply to outfall 004." However, as the commenter points out, the limits found in the Draft Permit are actually 15 mg/l maximum daily and 15 mg/l average monthly. These limits were established in the 1993 or previous NPDES permits for BPS and therefore remain in the Final Permit. Finally, in response to the general question, the permit does govern in the event of a conflict with the Fact Sheet.

9. Comment

The permittee stated that Region 1 should clarify inconsistencies between § 4.3.2 of the Fact Sheet and § A.7 of the Draft Permit regarding metal sampling for Outfall No. 004 once the air pollution equipment is in place. Specifically, the permittee sought clarification as to whether quarterly grab samples for nickel and zinc are required for Outfall No. 004.

Response

Section A.7 of the Draft Permit requires sampling and reporting for several constituents, including the 126 priority pollutants, after the air pollution control technology equipment is operational. Since nickel and zinc are two of the 126 priority pollutants, quarterly sampling and reporting for nickel and zinc at Outfall No. 004 are required.

10. Comment

The permittee stated that the requirement in § 4.3.2 of the Fact Sheet requiring that average monthly values for oil, grease, and TSS be calculated based on 30 consecutive days of data is inconsistent with guidance from EPA on completing the monthly discharge monitoring report. The permittee stated that average monthly values are "calculated with samples that are collected during that month if daily and samples that are collected in the weeks [sic] that ends in that month if collected daily." The permittee stated that § 4.3.2 of the Fact Sheet "should reflect this guidance."

Response

EPA agrees that the inclusion of the language "30 consecutive days" in the Fact Sheet is inconsistent with EPA guidance on completing monthly discharge monitoring reports (DMRs). The language "30 consecutive days" comes from the effluent guidelines at 40 CFR Part 423, which specifies that metal-cleaning waste limits are "Maximum for any one day" and "Average of daily values for 30 consecutive days shall not exceed ..." However, in general, EPA Region 1 has allowed permittees to report this as an average monthly value for convenience and in order to be consistent with the DMR reporting guidelines. EPA notes that the Draft Permit specified that these values would be "average monthly" values. Average monthly is defined in Part II of the permit as "... the highest allowable average of 'daily discharges' over a calendar month calculated as the sum of all 'daily discharges' measured during a calendar month divided by the number of 'daily discharges' measured during that month." Therefore, this Final Permit requires that the permittee report the discharges for Outfall No. 004 as average monthly values and continue to follow the DMR guidance.

11. Comment

The permittee stated that the requirement in § A.4.a of the Draft Permit that total residual oxidant be measured continuously using the amperometric method described in § A.4.d of the Draft Permit cannot be achieved. In addition, the permittee stated, this requirement is not consistent with § 4.5.1.d of the Fact Sheet, which states that the total residual oxidant will be measured using the electrode method described in 40 CFR Part 136. The permittee stated that only the electrode method can perform continuous monitoring with an on-line instrument and that the Draft Permit should be clarified to allow measurement by this method.

Response

EPA will not require continuous monitoring for compliance with chlorine limits. EPA will require compliance monitoring using the amperometric test method on a grab sample. EPA has identified several instruments that are capable of continuous on-line measurement using a method based on the amperometric method. EPA agrees, however, that although the procedure these machines use is based on the amperometric method, the machines do not strictly meet the requirements of 40 CFR Part 136, Table 1B, for compliance purposes.

EPA will, however, require <u>reporting</u> of total residual oxidants using continuous monitoring. EPA Region 1's research indicates that a continuous monitor is available from Hach Corporation. The Hach CL17 chlorine analyzer uses the DPD method. EPA could not find information on the electrode method.

The permittee may choose an instrument that uses either the DPD method or the modified amperometric method. Information obtained from the continuous chlorine analyzer will be used to ensure that the facility is taking grab samples at times when the chlorine levels are expected to be at the maximum.

EPA notes that § A.5.a (cooling tower blowdown) of the Draft Permit also requires continuous monitoring of free available chlorine. Although the company did not specifically comment on this section, the comment and response above applies. Therefore, EPA has changed chlorine monitoring of the blowdown streams to allow a grab sample for free available chlorine using the amperometric method for compliance purposes. Note, the Final Permit separates the blowdown streams into three separate outfall locations (see § A.5.a,§ A.6.a,§ A.7.a). The permittee will be required to determine compliance by taking and analyzing grab samples at each outfall location. Continuous monitoring and reporting of free available chlorine levels will also be required, but it will only be a reporting requirement.

12. Comment

The permittee stated that it is not appropriate to establish an average monthly total residual oxidant limit that is well below the detection limit of the test method. Furthermore, the permittee stated that the average monthly limit in § A.4.a of the Draft Permit for total residual oxidant should be eliminated altogether because the maximum daily total residual oxidant limit set by the permit is merely 0.015 mg/l above the detection limit of the test method. The permittee also stated that the language in § A.4.d of the Draft Permit for averaging total residual oxidant values below the test method should be eliminated from the permit because it conflicts with EPA's guidance on reporting values below the detection limit in monthly discharge monitoring reports.

Response

EPA Region 1 has set a new ML of 20 μg/l (0.020 mg/l) for total residual chlorine. This ML is achievable using the amperometric method.

EPA disagrees that the average monthly limit in § A.4.a of the Draft Permit should be eliminated altogether. The average monthly limit was established in order for the permittee to meet the chronic chlorine water quality criteria of Massachusetts, i.e., the average monthly value. The average monthly limit will be calculated from the daily value, and therefore no minimum level of detection is required.

The permit has been clarified to allow the permittee to use the value of zero for any sample results at or below the ML (0.020 mg/l).

13. Comment

The permittee stated that § A.5.a, footnote 2, of the Draft Permit limits chlorine discharges from the cooling tower to 2 hours in a single day, and that this implies there will be only one cooling tower blowdown stream for Outfall No. 003. The permittee stated that for the enhanced multi-mode system there would be one blowdown discharge; but if the entire station was retrofitted to closed-cycle cooling, there would be three blowdown discharges (i.e., 003A, 003B, and 003C). The permittee stated that § A.5.a of the Draft Permit should be revised if the entire station is retrofitted, but that no change was required for the enhanced multi-mode system.

Response

EPA agrees that there should be three separate blowdown discharge streams, and therefore the Final Permit has been changed to include three different blowdown waste streams. These new waste streams are identified as internal Outfall No. 003A, blowdown from cooling tower for Units 1 and 2; Outfall No. 003B, blowdown from cooling tower for Unit 3; and Outfall No. 003C, blowdown from cooling tower for Unit 4.

EPA notes, however, that the entire station closed-cycle information submitted by the permittee in November 2001 did not identify separate blowdown streams for the different generating units.

14. Comment
The permittee stated that the limits in § A.5 of the Draft Permit for chromium and zinc-containing chemicals at Outfall No. 003 are not necessary because BPS does not intend to use chromium or zinc-containing chemicals when treating the cooling water.

Response
EPA disagrees that chromium and zinc limits should be eliminated from the permit. Permit limits for chromium and zinc were developed based on the technology limits defined in the steam electric effluent guidelines at 40 CFR Part 423. The metals chromium and zinc are limited because cooling tower chemicals might contain these constituents. Although BPS indicates it does not intend to use chromium- or zinc-containing metals, it has not submitted analytical results or engineering calculations showing that these metals will be below detection levels in its discharge. The Draft Permit prohibits priority pollutants (except chromium or zinc) from being detectable in the discharge due to the addition of chemicals added for cooling tower maintenance. Compliance with this requirement may be met either through yearly sampling and reporting or, based on the permitting authority's discretion, by engineering calculations. Since chromium and zinc are priority pollutants, the permittee may chose to demonstrate compliance with the permit limits for chromium and zinc through engineering calculations. The Final Permit has been clarified to allow this method of compliance.

15. Comment
The permittee stated that the pH for the discharge canal (Outfall No. 001) should be between 6.5 and 8.5 or within 0.5 ssu of background, as in the current permit. The permittee stated that it was concerned that the designated pH range might be exceeded due to naturally occurring conditions of the inlet water source.

Response
EPA disagrees that the 1993 permit allows the pH to be between 6.5 and 8.5 or within 0.5 ssu of background. The 1993 permit states that the pH shall not be less than 6.5 standard units nor greater than 8.5 standard units or shall not be more than 0.2 standard units from the naturally occurring range (see Part I.A.2.c, page 9 of 31, of 1993 permit). This requirement is consistent with the MA DEP water quality standards for pH. Therefore, EPA has added the following language to the permit: "The pH shall not be less than 6.5 standard units nor greater than 8.5 standard units or shall not be more than 0.2 standard units from the naturally occurring range."

16. Comment
The permittee stated that heat load calculations should be based on a fixed specific gravity, not the specific gravity of saltwater, which can vary. The permittee stated that to be consistent with the past reporting of heat load values, the specific gravity of pure water, 8.344, should be used rather than a variable value.

Response
Although it would be slightly more accurate to base the heat load calculation on the specific gravity of saltwater, EPA agrees that basing the heat load calculation on the fixed specific gravity of pure water (i.e., 8.344), as the permittee requests, will be consistent with past calculations and will be more convenient.

The Draft Permit based the value of the heat capacity (C_p) on water with the salinity of seawater (see page 4 of the Draft Permit). Therefore, to be consistent with the above comment and response, EPA has changed the value to be used for heat capacity from 0.94 Btu/lb°F (saline water) to a fixed value of 1.0 Btu/lb°F (pure water).

17. Comment
The permittee stated that the quarterly whole effluent toxicity (WET) testing schedule in § A.16 of the Draft Permit is not practical. The permittee stated that the scenarios designated by the Draft Permit are worst-case scenarios that are not likely to occur each quarter. The permittee stated that a more sensible sampling requirement would be to perform WET testing three times per year for 2 years, with each sample collected during specified discharge conditions.

Response
EPA disagrees with this comment and with the company's proposed sampling schedule as outlined in its comments on the Draft Permit.

The permittee states that the scenarios designated by the Draft Permit are "highly unlikely" to occur. This implies, however, that they might occur, albeit on an infrequent basis. The concept of toxicity testing is to test during "worst-case scenarios." Therefore, no changes to the toxicity testing schedule have been made in the Final Permit.

EPA believes it is possible for BPS to arrange for the discharges to occur as required, as specified by the toxicity testing requirement. However, the Final Permit will allow BPS to seek an alternative sampling scheme if, based on operation considerations, the facility is prohibited from discharging all the constituents as outlined in the permit. Therefore, the Final Permit requires that BPS collect the samples, to the maximum extent possible, as outlined in the permit. BPS will be allowed to request an alternative schedule for toxicity testing from EPA. The permittee will be required to submit any such request in writing at least 60 days prior to that quarter's sampling event and must state the reason(s) why such a variance is required. EPA may or may not grant such a change in sampling protocol based on its review of the company's submittal.

No changes to the permit's toxicity testing requirements are allowed unless the permittee receives written approval from EPA, with concurrence from the MA DEP.

18. Comment
The permittee stated that the flow limit for Outfall No. 017 might need to be reevaluated as the Draft Permit is further revised. The permittee stated that this would be necessary if modified intake screens are installed on Units 1 through 3 as part of the enhanced multi-mode system. The permittee stated that the maximum hourly flow rate for Outfall No. 017 in § A.8 of the Draft Permit is based on the current design of the intake screens, and that this limit would need to be revised if the enhanced multi-mode system is to be installed at BPS.

Response
The Final Permit is based on an entire station closed-cycle system and not the enhanced multi-mode system. The entire station closed-cycle design uses the intake for Unit 4 on the Lee River for make-up water, making it the primary source of water for the facility. Because Outfall No. 017 is for the backwash at the current intakes for Units 1, 2, and 3 in the once-through mode, it will no longer be necessary when the facility converts to the entire station closed-cycle cooling system, except for those brief periods of time when the facility is allowed to switch from closed-cycle to once-through cooling.

Because at this time the facility has not submitted any information about future modifications to the intakes and what the resulting backwash flow would be, EPA has no basis for changing the flow condition contained in the Draft Permit. Therefore, no change to the permit has been made, and the limit of 0.22 million gallons per hour applies.

19. Comment

The permittee stated that operation of the screen wash on Units 1, 2, and 3 should not be limited to 122 hours of operation and should not be limited to when BPS is operating on once-through cooling. The permittee stated that the screen wash system should not be limited as set forth in § A.8.d of the Draft Permit. The permittee stated that even when the intake is not in service and BPS is on closed-cycle cooling, BPS needs to maintain and test the screen wash system to ensure that all pumps are working. The permittee stated that the restrictions do not make sense and should be eliminated.

Response

EPA disagrees that the restrictions in screen backwash do not make sense and should be eliminated. However, EPA agrees that the Draft Permit did not allow for maintenance and testing to ensure that all the pumps are in working order. The permittee did not request alternative flow limits based on how often the screen backwash system needs testing, but EPA now understands that some allowance is needed to maintain and test the screen wash system. Therefore, EPA will require the facility to report the number of hours (and flow) when the screen wash system is tested. The Final Permit retains the requirement that the screen wash shall not operate more than 122 hours per year when it is used for once-through cooling.

20. Comment

The permittee stated that the flow rate limit for Outfall No. 020 in § A.9 of the Draft Permit should be changed from 13 MGD to 18.2 MGD, as requested in BPS's permit application. The permittee stated that the Lee River intake screen wash cannot be reduced by the same rate as the intake flow, and that Region 1 incorrectly stated in the Fact Sheet that BPS can reduce the screen wash flow proportionately to the cooling water flow. The permittee stated that reducing the intake flow does not reduce the screen wash flow because the wash pumps still need the proper flow to effectively clean the intake screens. In addition, the permittee stated that the fish pumps still need the proper flow for the fish bypass system to work efficiently, and the screen wash system needs to be fully operational whenever any water is being drawn through the Lee River intake.

Response

EPA believed it would be possible for BPS to operate fewer screens, and therefore have less screen wash, when operating the facility in closed-cycle mode. No change to flow rate for the fish bypass system was made in calculating the flow for Outfall No. 020 in the Draft Permit.

In response to the comment, EPA will change the flow limit for Outfall No. 020 from 13 MGD to 18.2 MGD as the permittee requests. However, EPA anticipates that impingement rates will decrease significantly when the facility dramatically reduces its flow by converting to closed-cycle cooling. Currently, the screens are washed continuously. In anticipation of reduced flow, EPA has changed the screenwash frequency to three times per day.

21. Comment

The permittee stated that 9 years of data support eliminating or at least reducing, the requirement for the canal inspection in § A.22 of the Draft Permit. The permittee stated that in the 9 years that this inspection has been performed, only one dead fish has been observed. The permittee stated that since divers are on-site three or four times a week cleaning the net and are instructed to notify BPS of any observed fish mortality, Region 1 should eliminate the inspection requirement or change the time period in § A.22 to June through September, when the discharge temperatures are higher.

Response

EPA has addressed this comment elsewhere in this response to comments.

22. Comment

The permittee stated that in the event of a fish kill, there is no need to sample for dissolved oxygen at an intake that is not in service. The permittee stated that § A.22.b.2(2) of the Draft Permit requires dissolved oxygen readings at both the Taunton and Lee River intakes and at the venturi. The permittee stated that it makes no sense to require such readings at an intake that is not in service at the time, and that this section should therefore be revised.

Response

In the event of a fish kill, EPA is interested in determining dissolved oxygen concentrations over a wide spatial scale. The intakes on either side of the station provide convenient sampling locations and cover a wide are in near proximity to the plant. Thus, EPA believes that dissolved oxygen readings at both locations do need to be collected in the event of a fish kill.

23. Comment

The permittee stated that the flow rate for Outfall No. 001 in § A.4.a of the Draft Permit needs to be raised to 132.1 MGD. The permittee stated that the flow at Outfall No. 001 was not calculated appropriately for the Draft Permit and did not include service water flow. The permittee also stated that redesign of the service water system was not considered in Stone & Webster's analysis of an entire station closed-cycle alternative.

Response

EPA addressed the issue of the discharge flow from Outfall No. 004 previously and agrees that the maximum daily flow in the Draft Permit was off by 3 MGD. However, EPA does not agree that the permit limit for Outfall No. 001 for closed-cycle cooling (39 MGD) was not calculated properly. BPS submitted information indicating that 38 MGD was the total blowdown volume from cooling towers. EPA used this volume in its calculation of the discharge limit at outfall 001.

In November, 2001, USGen NE submitted extensive biological, engineering, and legal information to EPA. Volumes IV and V of this five-volume set, entitled *Review of Technologies to Reduce Thermal Discharges, Entrainment, and Impingement Associated with BPS*, provided detailed engineering and costing information on the entire station closed-cycle cooling option. EPA and its consultants carefully considered this information and, in fact, relied on much of it in developing the Draft Permit conditions.

The engineering information submitted in these documents led EPA to believe that the service water flow was included in the design of the entire station closed-cycle system.

Section 2 of Volume IV provides an introduction and background information. On page 2.2 of that section, BPS states that "[t]he design circulating and **service water flow rates** and temperature rises for the four generating units for which the cooling towers are sized are presented in Table 2.2-2" (emphasis added). Table 2.2-2 then shows the combined condenser duty, flow, and maximum temperature rise for Units 1, 2, 3, and 4 and service water for four units. The combined flow listed in that table is **931,000** gallons/minute, with the service water flow accounting for **31,000** gallons/minute of the total.

The statement found on page 2.2 is repeated on page 3.3-2 of § 3.3 entitled "Closed-Cycle Cooling Towers." Table 2.2-2 is repeated as Table 3.3-2 on page 3.3-2. BPS added the following sentence directly after Table 3.3-2 on page 3.3-2: "The maximum effect on station withdrawals and heated discharges to Mount Hope Bay resulting from conversion of the entire station to mechanical-draft cooling towers would be to reduce withdrawals to 39,000 gpm in the case of salt water cooling towers ...".

In § 3.3.5, "Entire Station Closed Cycle," on page 3.3-25, BPS states that "Retrofitting of the entire Station with conventional closed-cycle mechanical-draft cooling towers that utilize salt water would reduce cooling water flows from 931,000 to 39,000 gpm or 96 percent in the total Station potential circulating cooling water flow." Note that the 931,000 gpm is the figure cited in both Table 2.2-2 and Table 3.3-2 as the combined station flow, including the service water flow. In addition, BPS submitted a report entitled *Feasibility Study of Cooling Water System Alternatives for Brayton Point Generating Station* in January 1997 (see Administrative Record no. 211). Page 2-3 of that report states that "[a]n additional once-through flow of 31,000 gpm is used by the service water system required by all four units for bearing cooling water and other plant uses."

Therefore, based on information the company submitted, EPA reasonably concluded that the service water system was included in the design of the entire station closed-cycle system. EPA's CWA § 316(b) conclusion was based on a withdrawal of 56 MGD for the entire station closed-cycle system, not the 132.1 MGD that the company now claims is necessary.

The comment states that the service water system would require 63,000 gpm or approximately 90 MGD. EPA notes that this amount of service water flow conflicts with earlier information submitted by the company. Specifically, as mentioned above, earlier engineering information describes the service water system as requiring 31,000 gpm or about 44.6 MGD. Also, the water balance diagram the company submitted with its January 15, 1998, NPDES renewal application indicates that the service water system requires about 22 MGD. The actual amount of service water required is further put in question by an April 19, 2002, submittal from the company (see AR 536) in which the company states that the combined service water system flow rate is 59,000 gpm or about 85 MGD.

EPA also points out that the service water system contributes a thermal load to the bay. The engineering information submitted in the November 2001 documents states that the condenser duty of the service water system is 232.7 MBtu/hr, that the flow is 31,000 gpm, and that the temperature rise is 15º F. Using this design information and assuming the service water system operates for approximately 8,064 hours annually (48 out of 52 weeks of the year), the annual heat load to the bay from the service water system would be about 1.88 TBtu. The heat load to the bay would be more than doubled to 3.82 TBtu per year using the flow rate of 63,000 gpm submitted most recently by the company (flow rate x delta T x 8.34).

Regardless of whether the service flow is 31,000 gpm or the higher value of 63,000 gpm, EPA believes that the service water flow needs to be included in the design of the entire station closed-cycle system. EPA disagrees with the comment and will not allow an additional 90.1 MGD of once-through water for the service water system.

Therefore, EPA will not allow the flow rate for Outfall No. 001 to be raised to 132.1 MGD, as the company requests.

24. Comment
The permittee stated that the service water system for Units 1 and 2 would need to be modified for the variable speed drives (VSDs) on Units 1 and 2 to reduce cooling water flow. The permittee further stated that the service water flow would be increased from 22,000 to 29,000 under its proposed modified system to provide low-pressure screen wash water for the modified intake screens in the enhanced multi-mode system.

Response
The Final Permit is based on converting the entire station to closed-cycle cooling, including the service water system, as explained in response to the above comment. EPA therefore need not respond to these comments regarding service water flow for the enhanced multi-mode system.

25. Comment
The permittee stated that Outfall No. 005 is needed by BPS, and should remain in the permit, to allow for nonthermal backwashing of the condenser and intake piping. The permittee stated that BPS is

"infrequently" required to nonthermally backwash the condenser, a process that lasts for approximately 5 minutes.

Response
EPA will allow the use of Outfall No. 005 for nonthermal backwashing in the Final Permit. However, the facility will be required to apply the hours of operation of Outfall No. 005 to the facility's once-through cooling allowance, as set forth in the Final Permit.

26. Comment
PG&E said that EPA's Draft Permit would "essentially eliminate the withdrawal and discharge of water."

Response
EPA disagrees. Although the reductions of flow and heat will be substantial (94 and 96 percent, respectively), BPS will still be a "large" power plant under the proposed § 316(b) regulations and a "major discharger". After the improvements, BPS will still withdraw approximately 56 MGD from Mount Hope Bay and discharge approximately 42 MGD back to Mount Hope Bay. It will continue to be one of the largest industrial dischargers to Mount Hope Bay.

27. Comment
PG&E states that the membership of the TAC includes various agencies along with Save the Bay, the Taunton River Watershed Alliance, and CLF, as well as the U.S. Army Corps of Engineers. (FHE, n. 11)

Response
This is incorrect. The 1993 permit specified that the TAC membership would be composed of only the biologists from specific agencies. Other interested parties were, however, welcome to attend and participate in open meetings regarding the permit. The new permit does not continue to formally establish the TAC. However, EPA expects that the relevant agencies and other interested parties will continue to collaborate on scientific issues as they have in the past.

28. Comment
The permittee states that it understands "the importance of everyone doing its part for Mount Hope Bay," and that this is why it has proposed permit limitations that would represent a reduction in thermal discharge and cooling water intake flow from levels authorized in the current permit and Memorandum of Agreement II (MOA II) between the permittee and the regulatory agencies. Specifically, the permittee states that its proposed thermal discharge limits would require (1) a 33 percent reduction in Btus discharged from levels allowed by the MOA II, and (2) intake flow reductions of 33 percent from the level allowed in the MOA II and 50 percent from the level allowed by the current permit. The permittee states that these would be "dramatic" reductions returning thermal discharge and intake flow volume to levels that existed in 1970, before unit 4 was built at the power plant.

Response
EPA is pleased that the permittee appears to agree that there is a serious environmental problem in Mount Hope Bay and that changes in plant operations are a necessary part of the solution. As discussed elsewhere in this document, EPA acknowledges that the reductions in thermal discharge and intake flow proposed by the permittee are significant, but the Agency does not believe they would be sufficient to meet the standards of CWA § 316(a) and (b).

EPA further notes that the enhanced multi-mode system on which the permittee has based its proposed alternative permit limits would be capable of achieving much greater heat reductions than those suggested by the permittee (see AR 3214). The company assumed a 14 TBtu reduction, resulting in a proposed permit limit of 28 TBtu. However, using information supplied by the company, such as the heat rejection rate of the cooling tower and the number of hours of cooling tower bypass due to icing or fogging, EPA has calculated that the enhanced multi-mode system should be able to reduce the heat load to the bay by about 23 TBtu annually. Therefore, EPA believes that a more reasonable annual heat load permit limit would be 19 TBtu for the enhanced multi-mode system.

EPA also notes that the permittee requests an annual average flow limit for the enhanced multi-mode system of 650 MGD. EPA would not typically set an annual average flow limit. Flow limits are expressed as maximum daily or average monthly limits. The company has proposed an average monthly flow limit of 925 MGD for the enhanced multi-mode system. No maximum daily flow limit has been proposed for the enhanced multi-mode system.

Response # VI.29	**Document #**: 1000, 1139, 1145, 1140, 1141 (duplicate)

Comment

Many commenters requested the following additions to the Draft Permit:

1. Stop the use of any biocide at the plant.
2. Eliminate the ability of the plant to use any once-through cooling systems.
3. Reexamine the permit in five years and enforce the CWA immediately.
4. Protect fish migration and spawning in the nearby rivers.
5. Pretreat chemical and metal wastes prior to discharge and cover the coal pile.
6. Test shellfish for arsenic, hexavalent chromium, and other metals. Also, test shellfish and sediment in the five rivers immediately and regularly.
7. The thermal discharge limit should be 0.8 TBtu.

Response

1. BPS has substantially reduced the use of biocides and chlorine by first using targeted chlorination and physical methods of fouling removal. This approach will not completely eliminate the use of biocides, but BPS has made substantial efforts in reducing the use of these chemicals. The use of biocides, including Spectrus CT1300, is discussed in more detail elsewhere in this document (see response to Chemicals).
2. The Final Permit allows a limited number of hours of once-through cooling. This issue is discussed elsewhere in this document.
3. The permit will expire and be up for renewal in five years.
4. EPA believes the permit will dramatically reduce impacts from the current plant operations on fish migration and spawning habitat.
5. BPS currently pretreats chemical and metal wastes prior to discharge, and although it is not feasible to cover the coal pile, regular spraying with water is performed to reduce coal dust emissions.
6. Quahogs have been routinely tested for heavy metals for a number of years, and they have for the most part contained very low levels of these contaminants.
7. Based on EPA's § 316(a) analysis, the Agency believes that a thermal discharge of 1.7 TBtu is sufficient to assure the protection and propagation of the balanced indigenous population.

VII. Miscellaneous Comments

Response #: VII.1	**Document #**: 1000, 1001, 1005, 1007, 1009, 1013, 1014, 1015, 1017, 1018, 1020, 1021, 1022, 1023, 1024, 1025, 1027, 1030, 1031, 1032, 1034, 1036, 1040, 1041, 1042, 1044, 1045, 1046, 1048, 1049, 1050, 1051, 1052, 1055, 1057, 1058, 1059, 1060, 1061, 1065, 1068, 1070, 1073, 1076, 1083, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1097, 1098, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1134, 1135, 1136, 1137, 1138, 1140, 1141, 1142, 1143, 1144, 1147, 1149, 1150, 1151, 1153, 1156, 1157, 1164, 1165, 1166, 1167, 1168, 1177, 1179, 1181, 1183, 1188, 1192, 1194, 1195, 1197, 1199, 1200, 1206, 1207, 1208, 1211, 1212, 1213, 1226, 1229, 1231, 1232, 1233, 1234, 1235, 1237, 1238, 1241

Comment
EPA received approximately 123 general or rhetorical comments on the Draft Permit. Many of the commenters offered their personal support of the Draft Permit conditions. A minority of the commenters personally opposed the Draft Permit's conditions in general terms.

Response
These general comments have been considered.

A. Legal

Response #**: VII.2- 9**	**Document #**: 1218

2. Comment
PG&E-NEG stated that BPS is not responsible factually or legally for the fishery decline in Mount Hope Bay. It stated that the CWA does not direct that permit limits be set at levels needed to "bring the fish back" but, rather, to ensure that operations (1) will not cause "appreciable harm" under CWA § 316(a), and (2) will prevent "significant adverse environmental impacts" under § 316(b). The permittee states that EPA has designed the permit conditions to try to bring back the fishery and to allow the relaxation of fishing restrictions, and that EPA has created a unique standard of law to apply only to BPS and that is unsupported by applicable facts or law.

Response
EPA has responded to these points elsewhere in this document, but reiterates some of that discussion below.

Consistent with the overarching purposes of the CWA, a goal of this permit is indeed to help give the fish populations in Mount Hope Bay a chance to recover. This goal does not, however, provide the legal basis for the permit limits. As discussed in EPA's July 22, 2002, Permit Determinations Document and elsewhere in this response to comments, the limits in the permit have been determined in accordance with the requirements of CWA §§ 316(a) and 316(b), and applicable State water quality standards, and need no further justification. EPA has, however, determined that the limits in this permit are likely to help restore the fishery as well.

Under CWA § 316(a), thermal discharge limits must be sufficient to assure protection and propagation of a "balanced indigenous population of shellfish, fish, and wildlife in and on that body of water." See July 22, 2002 Permit Determinations Document, § 6.2. It is true that EPA regulations addressing § 316(a) determinations for existing plants allow a permittee to meet this standard by a showing of no "appreciable harm" from past thermal discharges. Ultimately, however, the question is whether protection and propagation of the BIP will be assured in light of the various other stressors that might exist. If the thermal discharges have caused no appreciable harm in the past, it is at least likely that they should assure protection and propagation of the BIP in the future. On the other hand, if the discharges have caused appreciable harm, then the discharge does not satisfy CWA § 316(a). While there may be many types of such "appreciable harm," EPA believes that when a discharge causes or contributes to the decline of a fishery, then it has caused appreciable harm and would not assure protection and propagation of the BIP (cumulative impacts must also be considered in this evaluation). Furthermore, if the discharge will cause or contribute to the prevention of the recovery of the BIP, that would also mean that it does not assure the protection and propagation of the BIP (and that it will not cause appreciable harm). An applicant could also fail to carry its burden under CWA § 316(a) without any demonstration on EPA's part that the applicant's discharge will prevent the recovery of a fishery. This is because there are other types of appreciable harm, as discussed in Chapter 6 of EPA's July 2002 Permit Determinations Document, and the burden is on the applicant to show that its discharge **will** assure protection and propagation of the BIP.

EPA has concluded that BPS's past thermal discharges have caused appreciable harm to the BIP. Furthermore, EPA rejected the § 316(a) variance-based limits proposed by the permittee because the Agency was not convinced that they were stringent enough to assure the protection and propagation of the BIP in Mount Hope Bay. In this Final Permit, however, EPA has established limits under § 316(a) that do assure the protection and propagation of the BIP.

The permittee cited *In the Matter of Public Service Company of Indiana, Inc., Wabash River Generating Station, Cayuga Generating Station*, in support of its interpretation of the CWA and the appreciable harm standard. (1 EAD 590 (November 29, 1979)) This case, however, simply reaffirms EPA's conclusions—i.e., that where past discharges have caused "appreciable harm," the statutory requirement of protecting the BIP has not been met and further thermal effluent reductions are needed.

CWA § 316(b) requires that the design, location, construction and capacity of CWISs reflect BTA for minimizing adverse environmental impacts. That being said, if the intake causes or contributes to a fishery decline or prevents the recovery of a BIP, these would be important **adverse environmental impacts** that must be minimized. They would not, however, necessarily be the only adverse impacts that must be addressed. Other impingement and entrainment effects must also be minimized. As discussed in the July 22, 2002, Permit Determinations Document and elsewhere in this response to comments, the mandate of CWA § 316(b) is not limited to requiring only that "significant" adverse impacts be minimized. Rather, all adverse environmental impacts, significant or otherwise, must be minimized by the application of BTA. See July 22, 2002, Permit Determinations Document §§ 7.2.5c and 7.2.5d. EPA has stated, however, that the "magnitude" of an impact is important in deciding the extent of "minimization" required. *Id.* Hence, more serious adverse impacts warrant more serious expenditures for reductions based on the "wholly disproportionate cost" test. *Id*. EPA has also recognized that *de minimis* impacts might not require minimization, but this is clearly irrelevant to the present case.

EPA considered the adverse effects of the BPS cooling water intakes from various perspectives—e.g., absolute numbers of organisms taken, percentages of populations taken, overall ecosystem/community effects. All of this was considered against the backdrop of the ecosystem's condition to determine what was needed to achieve "minimization." See July 22, 2002, Permit Determinations Document § 7.2.5c.

Finally, as discussed in the July 22, 2002, Permit Determinations Document and elsewhere in this document, the permit limits must also ensure compliance with any applicable State water quality standards. This Final NPDES Permit is consistent with all of these requirements under the CWA.

EPA has not based the permit on the view that BPS must be held legally accountable for the decline of winter flounder in Mount Hope Bay. As discussed above, EPA has developed these permit limits applying CWA §§ 316(a) and 316(b) and applicable water quality standards. EPA's assessment of what these provisions require must, however, take into account the current state of the fishery. See *In Re: Public Service Company of New Hampshire, et al.* (Seabrook Station, Units 1 and 2), 1977 EPA App. LEXIS 16, 19, 1 EAD 332 (1977) (in setting permit limits under CWA §§ 316(a) and (b), EPA must consider the existing environment, not some hypothetical environment). EPA also needs to consider what effects the plant may have had on the resource as the Agency assesses the effects it thinks the plant may have going forward. In this regard, EPA has considered the permittee's role in the collapse of the Mount Hope Bay fishery and has concluded that the permittee's operations have contributed significantly to the fishery's decline. Even if this were not the case, the permit's limits would still stand based on the other considerations detailed in EPA's analysis.

EPA also points out that limits that meet the standards of the CWA might not necessarily be sufficient to "bring the fish back." EPA recognizes that it does not have authority to impose additional permit conditions upon the permittee in an effort to bring the fish back. On the other hand, EPA does expect that as a **result** of the permit limits it is imposing, not only will CWA requirements be satisfied, but the fishery will also be given a chance to recover, as long as other necessary steps are also taken, such as controlling overfishing. EPA notes that these other steps **are** currently being taken (fishing restrictions, CSO controls, and other steps).

3. Comment
PG&E-NEG stated that the Draft Permit is objectionable because it is a "dramatic and unwarranted departure from BPS's prior permits and from the laws governing Region 1's decision.

Response
EPA notes that the permittee does not have an entitlement to receive the same permit every 5 years, and there is no grandfathering or safe haven created by earlier permits. Rather, the permit must be reviewed every 5 years. The question is whether the new permit conditions are warranted now. Moreover, the "departure" is not quite as "dramatic" as the permittee suggests. One of the earlier permits required Unit 4 to operate closed-cycle, thus restricting intake flow and thermal discharge. Moreover, an earlier permit also established maximum temperature limits of 90 °F and a smaller delta-T requirement than that allowed by this Final Permit. Earlier permits also indicated changes might be needed to respond to any biological problems. Finally, earlier permits also contained limits that were based on thermal modeling now demonstrated to have been incorrect.

4. Comment
PG&E-NEG stated that the Draft Permit is based on "fundamental misinterpretations and misapplications of the applicable legal standards for determining (1) the 'best available technology' to reduce water withdrawals by and thermal discharges from a power plant, (2) the 'best technology available' for minimizing the environmental impacts of flows, and, (3) the degree of protection necessary for a 'balanced, indigenous population of fish.'"

Response
EPA disagrees and has responded to these comments elsewhere in this document.

EPA also notes that the BAT standard does not apply to water withdrawals. The standards applicable to water withdrawals are the BTA standard under CWA § 316(b) and State water quality standards.

5. Comment
PG&E-NEG claimed that important information is missing from the Administrative Record and supported this claim by pointing to letters from its counsel, Wendy Jacobs, dated August 12, 2002, and October 4, 2002.

Response
EPA disagrees. EPA has responded to this point in memoranda and letters to the permittee, which are included in the Administrative Record and incorporated herein by reference (AR 3021, 3022, 3024, 3025, and 3060).

EPA has also responded to this point elsewhere in this response to comments.

6. Comment
PG&E-NEG argued that the "governing legislative, judicial, administrative, and agency precedents are ignored or distorted" by EPA in the Draft Permit analysis.

Response
EPA disagrees that it has done this. EPA has discussed relevant precedents in its decision document and, as pertinent, in these responses to comments.

7. Comment
PG&E-NEG stated that it "appreciates the need for EPA Region 1 to do all that it reasonably can to protect Mount Hope Bay," but that the permit conditions are overly stringent, will not bring fish back, will cost PG&E-NEG hundreds of millions of dollars, and these costs are "wholly disproportionate" to the benefits that will result. The permittee stated that the Draft Permit is "unjust and unlawful."

Response
EPA notes that PG&E-NEG thinks that the Agency should do all it "reasonably can" to protect Mount Hope Bay. EPA thinks the test for its actions is whether they are authorized by the law. EPA thinks its permit is so authorized. As such the permit is neither unjust nor unlawful. Other issues noted in the comment are addressed elsewhere in these responses to comments.

8. Comment
PG&E-NEG stated that EPA's decision is "rife" with errors of law that "severely distort the relative burdens of proof assigned" to EPA and the permittee, and that EPA misinterprets and misapplies applicable legal standards. As examples of this, the permittee points to the following:

a. EPA erroneously requires under CWA § 316(a) that BPS ensure the recovery of fish populations that have declined throughout the region, instead of correctly requiring that BPS's discharges only be adequate to protect the population existing in Mount Hope Bay "today."
b. EPA erroneously determined BAT-based limits for thermal discharges (under CWA § 301) and BTA-based limits for cooling water intake (under CWA § 316(b)), even though EPA Headquarters and Region 1 have previously determined what the BAT discharge and BTA intake limits should be for units like those at BPS.

Response
EPA disagrees and has responded to these points elsewhere in this response to comments.

EPA also notes that under CWA § 316(a), the permittee's discharge must not interfere with a BIP, which is not just the depleted population that happens to be left there today. See July 22, 2002 Permit Determinations Document § 6.2. This is an especially important consideration, given that the permittee has contributed significantly to the depletion of the population in Mount Hope Bay. The permittee's logic would suggest that if the permittee's discharge had killed all the fish in the bay, the permittee could discharge unlimited amounts of heat because there would be no BIP to protect.

EPA also disagrees that EPA Headquarters and Region 1 have previously determined what BAT discharge and BTA intake limits should be for units like those at BPS. As discussed elsewhere in this response to comments, in the absence of national technology standards for existing power plants, EPA develops technology standards for thermal discharge and cooling water intake at power plants on a case-by-case, BPJ basis.

9. Comment
The permittee agreed that restoring Mount Hope Bay's fishery so as to allow the relaxation of current fishing restrictions in the bay is a "noble goal."

Response
The permit's goals and specific conditions are, instead, determined by the application of the requirements of the Clean Water Act (CWA). In this case that means the application of CWA §§ 316(a) and (b) as well as applicable CWA provisions related to technology-based and water quality-based requirements. The application of these provisions is informed by consideration of the CWA's stated purpose of, among other things, restoring and maintaining the biological integrity of our nation's waterways. EPA presently believes that by satisfying these statutory requirements in this permit, and taking into account the steps being taken to address other stressors (e.g., fishing restrictions), the fishery of Mount Hope Bay will have a strong opportunity to recover. Moreover, if the fishery recovers, then presumably it will be possible to relax fishing restrictions, at the appropriate time, so that the public will be able to enjoy the beneficial use of the natural resources that belong to them. Of course, this does not mean that all fishing controls will be eliminated; sound fishery management will undoubtedly continue to be needed in the future. The application of CWA §§ 316(a) and (b) and water quality requirements are discussed in detail elsewhere in this document.

Response #VII.10-14	**Document #**: 1132, 1133, 1150, 1175

10. Comment
One commenter stated that EPA's Draft Permit would set the stage for the "long overdue recovery of Mount Hope Bay's ecosystem," and that, with certain modifications, it would fulfill the CWA's mandate to restore and maintain the "biological integrity of the Nation's waters." (1132)

Response
EPA agrees with the comment that compliance by BPS with the new NPDES permit, in conjunction with other necessary actions being undertaken (e.g., fishing restrictions), is needed to help allow the recovery of the fishery and ecosystem of Mount Hope Bay. EPA also agrees that the new permit is consistent with the purpose of the CWA, as stated by Congress, which is to restore and maintain the biological, chemical, and physical integrity of the nation's waters.

11. Comment
One commenter stated that it fully supported the legal and technical analysis supporting EPA's Draft Permit but indicated concern about whether the Draft Permit limits were sufficient to protect the BIP, given the ongoing and prior damage to the Mount Hope Bay ecosystem. (1133)

Response
This comment is addressed in detail in EPA's July 22, 2002, Permit Determinations Document, as well as elsewhere in this document. EPA does, however, believe the new permit limits, in conjunction with other

steps being taken (e.g., fishing restrictions, CSO control), should be sufficient to allow recovery of the ecosystem. These conclusions can be revisited as necessary at permit reissuance.

12. Comment
One commenter noted that BPS is operating under a permit that was first issued in 1973 and amended three times, only to relax the standards each time. (1175)

Response
EPA discussed the permitting history in some detail in Chapter 3 of EPA's July 22, 2002, Permit Determinations Document. The comment is not strictly correct, in that uncertainty and controversy regarding where to set the permit limits led to some limits being relaxed and then tightened again in subsequent permit modifications. See EPA July 22, 2002, Permit Determinations Document, Ch. 3, n. 1. The commenter is correct, however, that the overall result of the various permit changes over time was to relax the permit limits over time. However, each permit reissuance must be addressed on the basis of the information available at the time of permit development. Thus, a relaxation of the permit might be appropriate at one time, while a tightening of the same permit's limits might be appropriate at another time.

13. Comment
One commenter stated that EPA and MA DEP findings indicate that BPS has routinely violated Conditions I.A.1.c. and I.A.1.g. of the current NPDES permit and that the full extent of damage to the ecosystem from these violations has not been documented because of limitations in the monitoring program. This commenter stated that this situation renders all the more urgent the need to finalize new, more stringent conditions, as the permittee presently continues to operate under the 1993 permit. The commenter pointed out that EPA is authorized to enforce narrative permit conditions and urged EPA to both (1) take immediate enforcement action to stop BPS's violations of its current permit, and (2) impose interim limits more stringent than the existing permit to govern BPS's operations. The commenter noted such action was necessary because even if the permittee accepted the Draft Permit terms, it has been estimated that it would take about 4 years before the entire power plant can operate on closed-cycle basis. (1133)

Response
Conditions I.A.1.c. and I.A.1.g. of the currently effective 1993 NPDES permit (No. MA0003654) provide as follows:

* * *

> c. The discharges shall not jeopardize any Class SB/SA use of Mount Hope Bay and shall not violate applicable water quality standards or degrade the aquatic habitat quality.

* * *

> g. The thermal plumes for the station shall: (a) not block the zones of fish passage, (b) not change the balanced indigenous population of the receiving water, and (c) have minimal contact with the surrounding shorelines.

These narrative provisions set environmental requirements that "backstop" the numeric thermal discharge limitations. The narrative provisions were created, together with significant biological monitoring requirements, to try to ensure adequate environmental protection in the face of significant and unavoidable uncertainty regarding the future environmental effects of the continued and increased thermal discharges and cooling water withdrawals by BPS. Indeed, as discussed in Chapter 6 of EPA's July 22, 2002 Determinations Document, recent thermal discharge plume modeling, satellite photography, and thermal data have revealed that the original modeling by the permittee upon which the initial and existing CWA § 316(a) variances were based significantly underpredicted the extent of the thermal plume. It is now evident that the thermal plume often has much more than “minimal contact” with surrounding shorelines and that the thermal plume has interfered with fish migration and is capable of blocking zones of fish passage given its extent, location, and temperature. Furthermore, EPA has concluded that thermal discharges and water withdrawals by BPS have significantly contributed to the deterioration of the balanced indigenous population of organisms in Mount Hope Bay, degraded the aquatic habitat quality, and contributed to the violation of designated uses of the waterbody (as well as contributed to violations of the applicable dissolved oxygen standards). These conclusions are based on the analysis and findings discussed in Chapters 2, 5, 6 and 7 of EPA’s July 22, 2002, Permit Determinations Document and elsewhere in this document. See also, e.g., AR 2056. Thus, even though BPS’s discharge monitoring reports appear to indicate that the facility has largely complied with the **numeric** thermal discharge temperature standards in the permit (e.g., maximum temperature and temperature rise, see Condition I.A.2.a), other data indicate that the facility has not complied with the above-mentioned narrative “backstop” provisions of the permit.

Nevertheless, EPA has to date exercised its enforcement discretion not to take an enforcement action against BPS. Instead, EPA first joined the States in negotiating Memoranda of Agreement I & II with BPS to put a tighter cap on peak thermal discharges and cooling water withdrawals and agree on research goals. EPA then focused on developing a new permit for reissuance to BPS. This, of course, included an assessment of the environmental problems posed by the facility and the appropriate means of resolving any such problem. To date, EPA has continued to focus on getting the permit right, rather than on bringing an enforcement action. This does not necessarily mean that EPA would never decide to bring an enforcement action in response to the above violations, but it has no current plan to do so. See AR 2056.

EPA recognizes, however, that if its evaluation is correct, then not only has BPS contributed to the existing damage of the Mount Hope Bay ecosystem, but that the plant continues to perpetrate this harm as long as it continues operating under the existing permit (or MOA) conditions. This makes continued delay in achieving the new permit limitations a grave environmental concern. At the same time, EPA recognizes that the plant will need some time to install new cooling system equipment necessary to comply with the new NPDES permit limits. The question of what constitutes a reasonable implementation schedule is discussed in EPA’s July 22, 2002, Permit Determinations Document as well as elsewhere in this document. Because of the need for time to upgrade the plant’s cooling system, EPA expects to issue an administrative compliance order under CWA § 309(a) to BPS to provide a clear, reasonable, and enforceable timetable for BPS to achieve compliance with the new permit.

EPA recognizes that it might make sense to include reasonable interim limitations in such an administrative compliance order and will consider whether to do so. For example, it might make sense to impose interim limits with increasingly tighter thermal discharge and cooling water withdrawal requirements that will correspond to completion of the various phases of the cooling system improvements. As urged by the commenter, EPA might also need to consider whether additional enforcement action is warranted under the CWA to ensure suitable protection of the environment.

14. Comment

One commenter noted that the permittee has enjoyed unfair economic benefits due to its permit violations and that these benefits have been at the direct expense of Massachusetts and Rhode Island citizens and their natural resources. The commenter believed EPA should not allow the permittee to continue benefitting from its violations while new plants spend more to comply. The commenter argued that it is “time to level the playing field” between existing plants and newer plants. (1133)

Response
EPA agrees that damage to natural resources by BPS's cooling water system has occurred at the expense of Massachusetts and Rhode Island citizens. This issue is discussed elsewhere in this document. With respect to the call to "level the playing field" between existing and new power plants, the fact is that the CWA addresses existing and new plants identically in some contexts and differently in others. Specifically, CWA § 316(a) does not differentiate between new and existing plants. Similarly, facilities must satisfy applicable water quality standards regardless of whether the plant is new or existing. Technology-based standards, however, do allow different standards to be applied to new and existing plants if supported by consideration of the applicable factors from which the technology standard is derived. For example, a technology might be feasible at a new plant but not at an existing plant and, therefore, different technology-based standards could be applied to the two categories. The application of technology-based requirements is discussed in Chapter 4 (for BAT thermal discharge standards) and Chapter 7 (for BTA cooling water intake standards) of EPA's July 22, 2002, Permit Determinations Document as well as elsewhere in this document.

B. Economics

Response #: **VII.15-38**	**Document #**: 1004, 1035, 1045, 1064, 1075, 1110, 1130, 1132, 1133, 1150, 1167, 1168, 1171, 1172, 1174, 1179, 1184, 1187, 1206, 1208, 1223

EPA received a number of comments that the Agency has classified as dealing with economic issues in a general sense. These comments are addressed here. EPA also received comments, including some of the above-listed 20 comments, addressing specific types of economic issues. These include, for example, comments on the economic cost to the permittee of construction technologies that might be necessary for complance with the Draft Permit, the consideration of the costs and benefits of complying with the Draft Permit, and the possible effects of compliance with the Draft Permit on local taxes. Comments about these specific types of economic issues are addressed in other sections of this document.

1. General Comments

15. Comment
Several commenters stated that EPA's Draft Permit was both scientifically and economically sound. One of these commenters noted that EPA's Draft Permit shows the type of proper stewardship of natural resources that is needed to ensure future economic and environmental health. (1040) Another commenter, a university professor emeritus of economics and sociology, stated that EPA's justification for the Draft Permit is lucid and convincing and that he supports it. (1064)

Response:
EPA has considered these comments and notes that they support the Draft Permit's limitations and specifically agree with particular aspects of EPA's analysis, including the Agency's scientific and economic analyses.

16. Comment
One commenter stated that the famous economic text *The Wealth of Nations* by Adam Smith cautioned that when members of industry collaborate "the conversation ends in a conspiracy against the public," and that members of an industry have interests that are "always in some respects different from, and even opposite to, that of the public... ." As a result, he further cautioned that industry's proposals must be "long and carefully examined, not only with the most scrupulous, but the most suspicious attention ..., [as they]

have generally an interest to deceive and even to oppress the public, and who accordingly have, upon many occasions ... [done so].” (1064)

Response:
In response to what EPA takes to be the gist of the comment, the Agency points out that it has attempted to the best of its ability to independently and objectively assess the information pertinent to the development of this permit. This is sound regulatory practice and is necessary to properly discharge the Agency’s legal responsibilities, regardless of whether or not one subscribes to the views expressed in the quoted passages from Smith. Of course, time, budget, data constraints, and the basic permit application and development process require EPA often to rely on information provided by the permittee. The Agency has tried, however, to make reasonable judgments on such matters and to explain its analyses so that the sources of information it relies on are identified. Finally, the fact that there may be penalties applicable to the provision of false information to the government should provide a disincentive for a permittee to engage in such tactics. Beyond all this, however, EPA strives to work as cooperatively as possible with regulated entities and, in this case, has engaged in a great deal of cooperative effort and information sharing with the permittee, as well as with other Federal agencies, the States, and the interested public.

2. Proper Cost Test(s)

17. Comment
One commenter stated that it is unfair to give old, more-polluting power plants, such as BPS, a competitive advantage over new, less-polluting power plants by holding them to less stringent pollution control standards. Instead, EPA ought to “level the playing field” for all power plants with respect to pollution control performance requirements. (1133)

Response
The commenter raises an interesting policy argument regarding the issue of “grandfathering” older, existing power plants so that they are subject to less stringent environmental regulatory standards than new or newer facilities. Resolving this policy issue, however, is beyond the scope of this individual permit action.

EPA recognizes that the policy argument presented by the commenter is often raised with respect to the regulation of old power plants, see, e.g., AR 2272, but the approach taken by Federal law is up to the Congress. Under the Clean Water Act, the significance of whether a plant is “new” or “existing” varies across different legal standards, and this variation is reflected in the multiple standards that must be applied in developing the new NPDES permit for BPS. These different standards are discussed in EPA’s July 22, 2002, Permit Determinations Document.

18. Comment
The Town of Somerset Board of Selectmen stated first that EPA’s permit should impose only “economically achievable costs” and later that EPA should require the “best technology available at an economically practicable cost.” (1004)

Response
EPA’s July 22, 2002, Permit Determinations Document and this document discuss the role of cost considerations in applying the various environmental standards at issue for this permit, including CWA § 316(a), CWA § 316(b), water quality requirements, and certain technology-based standards. As indicated by this discussion, the role that cost considerations play varies among these standards. It is unclear which standard(s) the commenter is referring to in its comment. EPA believes that when the commenter refers to an “economically achievable cost” test, it may be referring to the BAT technology-based discharge

limitations standard. EPA also believes that when the commenter refers to a “best technology available at an economically practicable cost” test, it may be referring to the BTA standard for intake limitations under CWA § 316(b). EPA’s discussion of these different standards is presented in Chapters 4 and 7 of the July 22, 2002, Permit Determinations Document, respectively, as well as elsewhere in this document. EPA has also explained that costs do not properly play a role in determining permit limitations based on CWA § 316(a) or applicable water quality standards. This is discussed in Chapters 5, 6, and 7 of the July 22, 2002, Permit Determinations Document and elsewhere in this document.

19. Comment

The Attorney General of Rhode Island stated that it was acceptable for EPA to consider costs to the company, as it had done, but that EPA had “discretion” regarding how much weight to give to these concerns. He also stated that consumer electric rates were not a factor that EPA was required to consider in any regard. He commented that EPA properly considered the six relevant factors, including cost, in setting BAT limits for thermal discharges. He stated that the permittee is now urging EPA to give cost greater consideration, but had previously argued to EPA that affordability was irrelevant. He commented that EPA, in any event, had properly considered costs and that the permittee’s arguments were off-target. He also stated that economic issues should not overwhelm concern about harm to the bay and that if economics is considered, then the economic harm to the State of Rhode Island must also be considered. Finally, he cited to a decision by the United States Supreme Court holding that BAT limits require the maximum use of economic resources possible to eliminate pollutant discharges. (See *Crushed Stone*, 449 US at 74.) (1150, 1208)

Response

EPA’s July 22, 2002, Permit Determinations Document and this document discuss the role of cost considerations in applying the various environmental standards at issue for this permit, including CWA § 316(a), CWA § 316(b), water quality requirements, and certain technology-based standards. As indicated by this discussion, the role that cost considerations play varies among these standards. Indeed, EPA has explained that costs do not properly play a role in determining permit limitations based on CWA § 316(a) or applicable water quality standards. Furthermore, in setting CWA § 316(b) technology-based intake limitations or discharge limitations based on applicable technology standards such as the BAT standard, EPA has interpreted the statute to require consideration of cost. A precise estimate of cost, however, is not mandated, and EPA agrees that the Agency is given a certain amount of discretion in weighing costs to reach its final permit determinations. EPA also agrees with the commenter that possible effects on consumer electric rates may not be a factor that EPA is **required** to consider, but EPA believes it **is** a factor that EPA has the discretion to consider in the course of evaluating costs and in applying the wholly disproportionate cost test under CWA § 316(b).

EPA agrees with the commenter that the Agency properly considered the required factors, including cost, in setting BAT limits for thermal discharges. EPA also agrees that the commenter has properly cited the United States Supreme Court’s conclusion in the *Crushed Stone* case, **see** 449 US at 74, that BAT limits require the maximum use of economic resources possible to eliminate pollutant discharges. The commenter is also correct that the permittee argued that affordability was irrelevant to development of this permit in the context of arguing that it should not be asked to provide certain financial information that EPA had requested. EPA concluded, as discussed in the July 22, 2002, Permit Determinations Document, that affordability (i.e., economic practicability) **is** relevant in developing case-by-case BPJ limitations applying both the BAT standard to thermal discharges and the BTA standard for cooling water intake, though it is **not** relevant to determining limitations based on either CWA § 316(a) or water quality standards. EPA and the permittee ultimately agreed that the permittee would provide a narrower set of financial information than initially requested by the Agency, and EPA ultimately concluded that the proposed limitations in the Draft Permit were affordable. The permittee has submitted no significant argument that these limitations are not affordable. While EPA's cost estimates have undergone some revision based on public comments, as discussed elsewhere in this document, EPA concludes that compliance with the Final Permit limits remains affordable for the permittee.

EPA does not believe that economic issues have overwhelmed concern about harm to the bay in this case. In any event, EPA believes it has properly applied the applicable legal standards in this case, including the pertinent environmental and cost considerations.

With respect to the comment that "economic harm to State of Rhode Island must also be considered," EPA made reasonable efforts to assess the social costs and benefits of the CWA § 316(b) permit limits. These estimates include effects on Rhode Island citizens. These benefits estimates are addressed elsewhere in this document.

None of these analyses, however, can quantify the complete economic harm from fish losses at the plant (or the full benefit of reducing this harm), and these analyses give no consideration to the loss of organisms other than fish. Moreover, these analyses do not consider the adverse effects of thermal discharges from the plant. Recognizing the shortcomings of the available methods for estimating the monetary benefits of making improvements at the power plant, EPA also considered the benefits of such improvements from a nonmonetized perspective, both quantitatively and qualitatively. This evaluation also considered the adverse impacts of plant operations on Rhode Island's natural resources.

In sum, EPA believes that the benefits of the proposed permit limitations justify the costs to the company and society of making the improvements that the Final Permit would require. As suggested by this analysis, compliance with the permit will substantially reduce the significant economic harm to public resources from BPS's operations.

3. Affordability to Permittee of Improvements Needed to Comply With the Draft Permit

20. Comment

A number of commenters stated that the permittee could afford the improvements needed at BPS to comply with the Draft Permit conditions and that the cost was not a reason to relax those conditions. (1035, 1208, 1150, 1132, 1133) One commenter specifically stated that the permittee had provided no data to substantiate claims that permit conditions would threaten BPS viability and that the low cost of BPS generation means that the plant is profitable now and would remain so even after complying with the conditions proposed in the Draft Permit. (1035)

Response

Based on our evaluation of economic information and consideration of public comments, EPA agrees that BPS can afford improvements at the power plant that will enable it to comply with the Final Permit limitations. EPA also agrees that cost is not a reason to relax the requirements for the BPS permit. As discussed in EPA's July 22, 2002, Permit Determinations Document and elsewhere in this document, the proper role of cost considerations varies across the different Clean Water Act standards that apply to the development of the new permit for BPS (e.g., CWA § 316(a), CWA § 316(b), water quality-based standards, technology-based discharge standards). Even where cost is a proper consideration, however, it is not a reason to relax the permit requirements in this case.

EPA also agrees with the comment that the permittee did not present substantiated claims that permit conditions would threaten the viability of BPS. Indeed, EPA does not believe the permittee actually presented any significant argument that the permit would threaten the plant's viability or result in the plant's closure. The permittee's arguments have concerned whether the permit's requirements are necessary or warranted, rather than whether they are affordable. Of course, many residents and representatives of the Town of Somerset, as well as local business interests, have expressed great concern over any possible closure of the power plant because of the tax revenues provided by the plant that support many important town services and keep local taxes low. But none of these commenters has provided any argument or data indicating that the permit conditions would require the plant's closure.

EPA also agrees with the commenter that BPS's low production costs help to make the plant profitable and that the plant would remain profitable after compliance with the new NPDES permit. As discussed elsewhere, the plant's use of coal as its principal fuel source is a major reason why its production costs remain low, and the NPDES permit in no way impedes the continued use of coal.

21. Comment

Many commenters stated that BPS will not need to shut down to comply with the proposed permit conditions because of its high profitability, but that even if the plant did shut down, the region's electric supply is adequate and would remain so in the future. The Conservation Law Foundation (CLF) stated that even though increased costs might cut into PG&E's profits, BPS is extremely profitable and will continue to be profitable for PG&E even after new controls are installed. CLF also noted that closed-cycle cooling will enable BPS to sell **more** electricity during highly profitable peak demand, hot weather periods. (1035, 1150, 1132, 1133, 1075)

Response

As discussed elsewhere, EPA agrees that the requirements of the new NPDES permit will not require a closure of BPS. EPA agrees that the data appear to indicate that the New England region generally has an adequate supply of electricity, even without BPS, although BPS is currently an important baseload facility in the region's energy portfolio. Nevertheless, the NPDES permit will not cause such a closure. As is also discussed elsewhere, EPA agrees that the plant will remain profitable even after steps are taken to comply with the permit. The permittee has not presented any significant argument that the permit would result in plant closure, but rather pointed out that the costs of compliance will cut into (not eliminate) profits. EPA agrees that the cost of compliance is likely to reduce overall profits. This is discussed in EPA's July 22, 2002, Permit Determinations Document as well as elsewhere in this document.

Finally, EPA agrees that closed-cycle cooling at BPS will enable BPS to generate and sell more electricity during peak demand, hot weather periods when the highest prices are paid for electricity. Indeed, the permittee has agreed with this as well. These additional profits somewhat offset the costs of installing the technology required to comply with the permit. They are not, however, so substantial as to fully offset the compliance costs. Thus, the costs of compliance will still be significant. EPA's cost assessments for the Draft Permit and for the Final Permit have taken this offsetting factor into account. Apart from BPS profits, it should be mentioned here that the ability to generate more electricity during peak demand, hot weather periods also adds an important energy supply benefit. These periods are the times when the region's electric supply is stretched to the largest degree. Indeed, in the past plants such as BPS have sometimes requested permission to discharge more heat than otherwise allowed by their NPDES permits to ensure adequate electric supply to prevent brownouts or blackouts. Closed-cycle cooling would allow BPS to operate closer to the limits of plant capacity, helping to ensure a sufficient electric supply for the region without harming the environment.

22. Comment

The Attorney General of Rhode Island stated that a plant like BPS makes considerable profits because it burns cheap coal while the wholesale market price for electricity is set by the most expensive generators. He stated that BPS is an inexpensive coal-burning, baseload plant that rarely sets the market price. He indicated that the State hired an expert consultant to evaluate the profitability of BPS and found that the plant is highly profitable and that the permittee has earned considerable net revenues since it purchased the plant in 1998, with estimates ranging from approximately $500 million to approximately $750 million, depending on certain assumptions. The Attorney General's office stated that it had undertaken an analysis that was conservative in a number of respects (e.g., did not consider installed capacity payments, did not include revenues from 1998) and still found that BPS was highly profitable, should remain so, and could afford the technology upgrades needed to comply with the permit. Its analysis states that the permittee indicated it had paid $398.5 million to purchase BPS in 1998 and that, therefore, the permittee made a 22 percent return on investment in 1999, a 32 percent return in 2000, and a 57 percent return in 2001. The last figure is based on net revenue for BPS during CY 2001 of around $227 million. The Attorney General's office points out that this is approximately three times the cost of the cooling system technology that EPA has based its permit limits on, and expenditures for the equipment would, of course, be amortized over many years. The Attorney General's office also states that such high returns clearly indicate that the permittee should be able to make the necessary pollution control investments while continuing to profitably reward investors as a result of BPS operations. In addition, the Attorney General stated that it undertook a conservative analysis that revealed that BPS should continue to earn significant net revenues even after conversion to a closed-cycle cooling system because units 1, 2, and 3 are inexpensive baseload, coal-fired units, and because reasonable projections of future market prices in New England, including the "standard offer" prices that will apply through 2009 in Massachusetts and Rhode Island for residential customers, should easily exceed the costs of generation. He stated that it would be entirely unreasonable to predict that BPS would shut down if required to convert to closed-cycle cooling. He further stated that his office concluded that the plant could afford about $30 of improvements per megawatt hour of electricity because the average sales price was $45 per mw-hr and the average production cost was $15 per mw-hr. His office concluded that since the cost of the proposed improvements would be around $3.11 per mw-hr, it was once again clear that BPS could afford the improvements while remaining very competitive with little effect on rates. Finally, he stated that these figures represented the best information his office could collect without the company providing internal confidential data, but that he had published these figures and the company had not refuted them. (1150, 1208)

Response

EPA agrees with the commenter that BPS has been an especially profitable plant since deregulation because BPS mostly burns coal, a relatively inexpensive fuel source, while wholesale electric prices are set by the most expensive generators. EPA agrees that BPS will rarely, if ever, set wholesale market prices. This is not the whole story, however, as BPS also sells electricity outside the wholesale markets. Nonetheless, EPA's analysis has considered the full picture and has also concluded that BPS is profitable and should remain so even after complying with the new permit limitations. EPA provided an analysis of this subject with the July 22, 2002, Permit Determinations Document and has now prepared a revised analysis in response to comments. While some of the figures have changed in the analysis in light of the Agency's new, increased estimate of the likely cost of the plant improvements needed to comply with the permit, the overall conclusions remain the same.

It should also be stated here that BPS's profitability has had only limited relevance in developing the proper NPDES permit limitations for BPS. The permit's thermal discharge limitations are based on CWA § 316(a), and profitability is irrelevant to setting limits under that provision. The permit's cooling water intake limitations are based on CWA § 316(b), which requires application of an "economic practicability" test. Economic practicability is not the same thing as profitability, but a plant's profitability may help to establish that certain expenditures are practicable. EPA has concluded that plant improvements needed to comply with the permit's intake limitations are economically practicable for BPS, and the plant's profitability supports this conclusion. In addition, the permittee itself has not presented any significant argument that compliance would be economically impracticable. It should also be noted that the permit's intake limitations cannot be made significantly less stringent owing to State water quality standards-related requirements. The plant's profitability is irrelevant to setting requirements necessary to comply with State water quality standards.

EPA notes that the commenter's conclusions regarding BPS profitability essentially agree with EPA's conclusions, although there are certain differences in the details of the respective analyses. EPA agrees with the commenter that the improvements needed at the power plant to comply with the NPDES permit should not result in plant closure and should have only a small effect on consumer electric rates. Finally, the Agency agrees with the commenter that the permittee's desire to keep certain financial information confidential[1] has made it more difficult for others to develop a precise estimate of exactly how much the plant can afford to spend while remaining viable, but it is not necessary to develop a precise estimate in this regard. Neither CWA § 316(b) nor § 304(b)(2)(B) requires the development of precise cost estimates, and since EPA has found that the costs at issue are economically practicable for BPS, the Agency need not go further and develop a precise estimate of exactly how much the plant can afford to spend.

23. Comment

The Attorney General of Rhode Island also commented that the overall larger fiscal problems being experienced by PG&E-NEG will not make BPS unprofitable or make the plant unable to afford the cooling system improvements needed to comply with the permit. He noted that the permittee has raised the issue of PG&E-NEG's overall fiscal problems, including 2nd quarter losses and securities downgrading, as reasons not to require conversion of the plant to closed-cycle cooling. He responds to this, however, by stating that the overall profitability of PG&E-NEG is irrelevant to whether BPS is a profitable asset. As long as BPS generates adequate profit over a reasonable time, he states, another entity will buy and operate BPS even if PG&E-NEG decides that it does not want to (i.e., if PG&E-NEG decides to sell BPS to raise capital to address other debts). The Attorney General states that the overall financial status of PG&E-NEG is not an appropriate consideration when developing the necessary permit limits under the CWA for BPS. He also comments that as a matter of public policy, the local public interest would not be served by making CWA permit decisions on the basis of facilitating BPS's serving "as a cash cow to plug financial holes" in other aspects of PG&E-NEG's operations. If EPA considered any of this, the Attorney General states that EPA also needs to consider costs to Rhode Island's environment and its commercial fishing and recreational industries, all while BPS has continued to use the State's resources free of charge. (1150)

Response

EPA agrees with the commenter that the fiscal problems being experienced by PG&E-NEG will not render BPS unprofitable or unable to afford the cooling system improvements needed to comply with the permit. EPA agrees that BPS is likely to remain in operation under the ownership of either PG&E-NEG or some new buyer of the plant. The permittee has, in fact, indicated to EPA and the media that it currently intends to sell BPS. EPA also agrees with the commenter that the CWA requirements to be reflected in the BPS NPDES permit generally should not be altered by the financial problems being experienced by the permittee's parent corporation, PG&E-NEG. For example, thermal discharge limitations necessary to ensure the protection and propagation of a balanced, indigenous population of organisms in the receiving water do not change because of a corporation's financial problems. It would also be inappropriate to allow a plant, for example, to destroy a bay in violation of applicable water quality standards simply because the facility, or its parent corporation, was experiencing economic difficulties.

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[1] As discussed in EPA's July 22, 2002, Permit Determinations Document and indicated in EPA's Administrative Record, the permittee provided some financial information on a nonconfidential basis and some on a Confidential Business Information (CBI) basis. The permittee persuaded EPA that the Agency had sufficient information to draw the conclusions needed for the permit without reviewing certain additional financial information that had been requested earlier.

On the other hand, in our evaluation of the cost of necessary improvements under CWA § 316(b), EPA has considered recent changes in the financial condition of the merchant power industry and adjusted its estimate of the likely discount rate applicable to the company or a successor owner of BPS in light of the industry's current conditions. While it is not required to develop a precise cost estimate, the Agency still thinks making such adjustments in light of current information is reasonable and appropriate. EPA's analyses of the cost of plant improvements and related economic issues are presented in the July 22, 2002, Permit Determinations Document and elsewhere in this document. EPA also notes that while the permittee pointed to its deteriorating corporate financial condition in its comments on the permit, it did not present any significant argument that it could not afford the required improvements or that the plant would close if required to make those improvements. Moreover, given BPS's low production cost and thus substantial operating profitability, EPA believes that the current financial weakness of the company is not a relevant factor in determining the economic reasonableness or practicability of the permit requirements.

Finally, EPA agrees that the permittee has been able to use substantial public resources at no expense and that this is a substantial economic benefit to the company. For example, BPS has been able to withdraw approximately a billion gallons of water a day from Mount Hope Bay for power plant cooling. In the process, trillions of organisms have been killed or injured from entrainment and impingement and the water has been returned to the bay at substantially hotter temperatures that alter the aquatic habitat. Purchasing one billion gallons of water per day from a municipal water department would likely cost millions of dollars, if such copious amounts of water were even available. Of course, BPS is not the only facility that uses public resources in this manner, and it is not barred from doing so as long as it complies with the requirements of the CWA and other applicable laws. These natural resources do not, however, belong to PG&E-NEG, and the company is not allowed to use them in any manner they see fit regardless of the consequences. These natural resources belong to the public. EPA has concluded that changes in how these resources are used by BPS are necessary to comply with the CWA, and EPA believes this NPDES permit is consistent with the CWA's requirements and authorities.

24. Comment

One commenter stated that given the known problems with air and water pollution by the plant, she wondered why PG&E invested in the plant in the first place. (1075)

Response

EPA agrees that the air and water pollution issues were publicly known at the time that PG&E-NEG purchased BPS. While PG&E-NEG would have to explain the details of its decision to invest in BPS, it is likely that the company believed BPS would be a profitable power plant. EPA believes that the company has been correct in this regard and that, even with the improvements required by the NPDES permit and air pollution laws, the plant will continue to be profitable.

EPA further notes that, because the air and water pollution issues were publicly known at the time that the company purchased BPS, the company should have identified and assessed these issues as part of due diligence before purchasing the plant and, as a result, should have anticipated the need for financial outlays and other operational effects that will result from permit compliance. If we assume reasonable prudence on the part of company management, it will have factored the expectation of these outlays into its valuation of BPS and adjusted its offering price accordingly. In making these adjustments, the company should have, in effect, established a financial reserve for the future obligations associated with environmental improvements. Now, the company should draw on that reserve and meet its known and foreseeable obligations under the CWA for environmental improvements. While it is unfortunate that the company's financial circumstances have deteriorated since its purchase of BPS, EPA believes this deterioration is not a relevant factor in determining whether these environmental improvements should now be undertaken under the CWA, particularly given BPS's low production cost and substantial operating profitability.

25. Comment
One commenter stated that she was willing to pay more for cleaner electricity, and that this will ultimately save money in avoided environmental harms and public health problems. She stated that if the plant can afford the improvements required by the Draft Permit, it should install them; if it cannot afford them, then it should shut down. Alternatives that can avoid environmental problems should be put in place. (1075)

Response
EPA agrees there will be benefits to the public from the environmental improvements necessitated by the permit. EPA has concluded that BPS can afford to make the necessary improvements and the plant will not need to close. Finally, EPA agrees that it is **generally** preferable to avoid or prevent environmental problems in the first place rather than to cause the problems and then try to fix them or offset them aftward.

26. Comment
The Somerset Board of Selectmen stated that EPA had underestimated what it would cost BPS to comply with the conditions of the Draft Permit and had overstated the company's ability to afford these costs. Town officials and individual employees from BPS expressed concern that the cost of complying with the permit could be "the straw that breaks the camel's back," when considered in conjunction with air pollution control expenses and could combine to put BPS out of business. (1168, 1004)

Response
As discussed elsewhere in this document, EPA believes its cost assessment for the Draft Permit was reasonable and appropriate. In response to comments, however, EPA has made some revisions to this assessment that have produced a somewhat higher cost estimate. EPA believes that its new cost estimate is also reasonable and appropriate. The revised analysis is discussed elsewhere in this document. EPA's revised cost estimate is still lower than the costs estimated by the permittee.

EPA's analysis continues to support the conclusion that the permittee can afford the improvements needed to comply with the new NPDES permit as well as with Clean Air Act requirements. The Agency's detailed financial analyses are discussed elsewhere in this document and in EPA's July 22, 2002, Permit Determinations Document. EPA does not believe the company has presented any significant argument that it cannot afford to satisfy these environmental requirements.

Effects on Consumers and the Local and Regional Economy

27. Comment
Many commenters stated that electric rates will not go up as a result of the expenses for permit compliance at BPS because plant costs "will not be automatically passed on to consumers" in the deregulated energy market. The Conservation Law Foundation of New England commented that increased costs at BPS to comply with the proposed permit would not likely affect consumers because BPS, as one of the cheapest units in New England, will rarely set the market price and in any event New England doesn't need BPS to ensure the reliability of the region's electric supply. (1035, 1110, 1132, 1150, 1184, 1208)

Response
EPA has assessed the potential effects on consumer rates of the improvements needed at BPS to comply with the new NPDES permit. The Agency provided such an assessment with the July 22, 2002, Permit Determinations Document and has revised that assessment in response to comments. EPA continues to find that the effect on consumer rates will be relatively small. EPA agrees that in the deregulated

wholesale electricity market, the permittee will not necessarily be able to pass its costs along to ratepayers. EPA also agrees that in the deregulated wholesale market BPS rarely sets the market price because of its low production costs and that the plant benefits from being paid based on the prices charged by more expensive generators. These matters are also discussed elsewhere in this document.

28. Comment

The Attorney General of Rhode Island stated that the permittee did not argue in its permit application materials either that consumer rates will increase by a significant degree if it is required to comply with the limits from the Draft Permit or that increased consumer electric rates are a reason not to impose the proposed permit conditions. He also commented that in nearly all cases under the current deregulated wholesale market the permittee will not be able to pass costs on to ratepayers. As a result, he stated that compliance expenses will only affect shareholders. The Attorney General indicated that his office hired an expert consultant who reviewed the consumer rate analysis prepared by EPA's consultant and found the results of that analysis to be "reliable and conservative." (1150)

Response

EPA agrees that its assessment of the potential consumer rate effects of NPDES permit compliance expenditures at BPS was reasonable and conservative. EPA has revised these estimates in response to comments and the figures have changed somewhat, but the rate effect is still relatively small. The Agency agrees that the permittee has not presented any significant argument that the NPDES permit will result in a major consumer rate effect, although it did disagree with certain aspects of EPA's analysis. EPA has responded to the permittee's comments elsewhere in this document.

29. Comment

The Attorney General of Rhode Island commented that any outages needed at BPS to install new cooling system technology to comply with the new requirements proposed by the Draft Permit would not pose any significant problems for the region's electric supply. He stated that his office hired an expert consultant to assess what impact, if any, modification of the BPS cooling system, and any associated generating unit outages, would have on "electric system reliability." On the basis of this analysis, his office concluded that the region's electric system can easily handle single unit at-a-time outages, or even outages of two units at-a-time not only during off-peak times, but also during peak winter and peak summer periods. The Rhode Island Attorney General indicates, however, that New England is overwhelmingly a peak **summer** market, suggesting that any potential concerns would be further reduced in the winter. He also states that capacity reserves are so significant in spring and fall that the system could easily accommodate multiple BPS units being simultaneously off-line for construction. In addition, his office agrees with EPA that BPS unit outages could be scheduled in conjunction with the independent system operator (ISO) to avoid peak periods, but reiterates that it is not necessary to do so for system reliability purposes. He also notes that the ISO has stated that the southeast Massachusetts/Rhode Island area is "export limited" in that this subarea has "significant amounts of locked-in generation beginning in 2002 due to lack of adequate export transmission capability." Finally, the Attorney General of Rhode Island also commented that apart from the question of unit outages, long-term generation efficiency losses as a result of installing cooling towers would be so minor as to have no consequence whatsoever for system reliability in New England or in the southeast Massashusetts/Rhode Island area. (1150)

Response

EPA generally agrees with the commenter's conclusions. EPA continues to believe, however, that consideration should be given to scheduling outages to avoid peak demand seasons, to minimize any potential pressure on the region's energy supply.

30. Comment
One commenter stated that if BPS shut down, people would get jobs in other fields. (1075)

Response
EPA does not believe the plant will need to close as a result of the NPDES permit.

31. Comment
Many commenters stated that BPS will not need to shut down to comply with the proposed permit conditions because of its high profitability, but that even if the plant did shut down, the region's electric supply is adequate and would remain so in the future. (1035, 1150, 1132, 1133, 1075)

Response
EPA agrees with the commenters that BPS will not need to close as a result of the NPDES permit. EPA also agrees that the region's current and future electric supply appears adequate even without BPS. Moreover, if BPS closed and the region needed more electricity, presumably new plants would come on-line to meet demand. Consumer electric rates would be higher, however, if BPS's generation was replaced by more expensive producers.

32. Comment
The Town of Somerset Board of Selectmen stated that environmental issues need to be considered in light of their "economic nexus." Various town officials requested that EPA investigate the effect that "shutting down" BPS would have on the economic well-being of the Town of Somerset as well as on electric consumers and the local regional economy. These Town officials stated that the Town's finances depend heavily on tax payments from the permittee and that the loss of these revenues could necessitate either large tax increases on personal and business property or significant reductions in municipal services (e.g., for education). The Board of Selectmen stated that this would be devastating to the Town and that this would occur at the same time that State and Federal aid to municipalities is diminishing. The Board of Selectmen also stated that if BPS shut down, the electricity it generated would need to be replaced by other, more expensive electric generation, which would increase electricity costs for consumers and make other power plants more profitable. (1004, 1168)

Response
EPA has concluded that BPS will not need to close as a result of the NPDES permit. This is discussed in detail in EPA's July 22, 2002, Permit Determinations Document and elsewhere in this document. The permittee has not raised any significant argument that closure would be required by the NPDES permit. EPA declines to conduct the wide-ranging assessment of the economic effects that would result around the region if BPS did close, and no such assessment is required under the CWA. EPA recognizes the Town's concerns related to tax payments and has discussed them elsewhere in this document. EPA agrees with the commenter that if BPS shut down, the electricity it generates would need to be replaced by other generators and that these generators would likely be more expensive (because BPS's production is so inexpensive and, therefore, profitable). EPA also agrees that this would likely result in increased costs for consumers, and that it would likely make some other power plants more profitable. With respect to the latter point, however, in applying the CWA, EPA is not concerned with making one plant more profitable at the expense of one or more other plants. EPA is concerned only with properly applying the CWA to each plant. In this manner, EPA strives to ensure a "level playing field" for all facilities in an industry. Of course, since some CWA standards are applied on a case-by-case basis to the specific facts of each situation—e.g., CWA § 316(a), § 316(b) (under present procedures), and water quality standards—applying the same standards to different facilities may result in different permit limitations.

33. Comment

The Town of Somerset's State Representative stated that BPS has played a key role in the area's economy for more than 30 years. She mentioned a study indicating that the BPS payroll was more than $15 million, and she stated that this money went to residents of the area who spent the money in the area. In addition, she stated that BPS spent approximately $8 million on goods and services from local businesses and had contributed tens of millions of dollars to local charities, in addition to its employees giving many hours of volunteer services to local charities. (1167) Representative Haddad's statements were echoed by a commenter who resides in Somerset. (1179)

Response

Although the Representative did not provide or otherwise identify the source of the statistics she cited, EPA has no reason to question them. Assuming they are accurate, they provide no reason to alter the NPDES permit's limitations. Again, EPA concludes that the permit will not require the closure of BPS. If anything, the permit requirements will likely result in some additional employment at the plant to construct (and perhaps to operate and maintain) the new equipment. Eventually, the region should also benefit from the recovery of the area's ecosystem and fishery so that current fishing restrictions can be relaxed.

34. Comment

The New England Council, a trade association of regional businesses, including PG&E, stated that it had studied New England's energy situation and concluded that the region's future economic health was linked to maintaining "reliable, reasonably priced energy and environmentally sound energy policies." This business group urged EPA to consider any implications that its NPDES permit might have for the region's energy situation, including any effects on the region's "fuel mix." The Council concluded that "fuel diversity" is one of the keys to ensuring a stable, reasonably priced fuel supply, and that coal-burning generation is an important element of ensuring adequate fuel diversity. It reached this view because New England relies far less on coal than do other parts of the nation, while coal is a cheaper fuel source with less volatile price shifts (than other fossil fuels such as oil and natural gas). The Council stated that BPS accounts for about half of New England's coal-burning generation and that any "premature" closure of a coal-burning plant like BPS could lead to increased prices for electricity in the region and a reduction in fuel diversity. It also stated that EPA's environmental goals were laudable, but that it was important to cautiously balance environmental goals with regional energy needs. The Council stated that it believes these two imperatives can go together. (1174)

Response

EPA agrees with the commenter that environmental and energy imperatives can be harmonized. EPA has considered the effects of the NPDES permit on New England's energy situation and on consumer rates. EPA has concluded that the region's energy supply will not be harmed and any consumer rate effects will be relatively small. In addition, complying with the permit by installing cooling towers will actually enable BPS to generate more electricity during hot weather, peak demand periods which actually will help the region's energy supply when it needs it most. Finally, the NPDES permit will not cause BPS to close and will have no effect whatsoever on BPS's ability to burn coal. Therefore, the permit should have no significant effect on the region's "fuel diversity." These issues are also discussed elsewhere in this document. (We also note that the commenter's point regarding the relative cheapness of coal as a fuel source generally corroborates the conclusion that EPA and many others have reached regarding the profitability of BPS.)

35. Comment

The Associated Industries of Massachusetts (AIM), a business trade association, commented that BPS is important to providing safe, reliable, affordable electricity for the New England economy. AIM stated that its members indicate that business is inhibited by a dearth of "competitively priced electricity" in the region. AIM indicated, therefore, that electricity generation by BPS is important for helping to keep prices as low as possible. AIM further stated that preserving fuel diversity in the region was also important, which means keeping coal in the mix, given the great regional reliance on natural gas. AIM also stated that it was important to remember that BPS could not necessarily just pass all its costs along to consumers in the deregulated market. AIM noted that PG&E was preparing to “voluntarily” spend millions to reduce air pollutant emissions from its plant. Finally, AIM urged EPA to consider cost/benefit analysis.

Response
EPA has concluded that the NPDES permit will not cause the closure of BPS and will have no effect on the plant’s ability to burn coal. Therefore, the permit is not likely to affect the region’s fuel diversity. EPA has also conservatively assessed the consumer rate effects that the permit could have and has found them to be relatively small. The permit will also have no significant effect on the region’s energy supply, which is currently more than adequate and is projected to remain so in the future. EPA understands that BPS cannot necessarily pass all its costs on to consumers in the deregulated market, but EPA also understands, as the commenter implicitly acknowledges, that BPS is a relatively cheap producer that is often paid through the wholesale markets based on the prices charged by higher-cost producers, and that this makes the facility quite profitable. EPA has considered costs and benefits where doing so is necessary under the CWA. Finally, EPA has considered the air pollution control technologies that are to be installed at BPS in various ways (e.g., consumer rate effects, impact to water pollutant emissions, etc.). EPA also notes, although it is not relevant to setting NPDES permit limits, that PG&E-NEG is not “voluntarily” spending millions to reduce air pollutant emissions. PG&E-NEG is required to take these actions by air regulations promulgated by the Commonwealth of Massachusetts.

36. Comment
Many commenters stated that by harming the fishery of the Narragansett Bay area, BPS operations have damaged the local economy, which relies, in part, on fishing for flounder and other species. Accordingly, some also commented that if BPS’s damage to the ecosystem and fish populations is resolved (along with other stresses), then the local economy should be strengthened as a result of improved fishing. The Attorney General of Rhode Island stated that Mount Hope Bay had for millennia been an important nursery and spawning area for the area’s fisheries, thus supporting a valuable commercial and recreational fishery throughout much of the 20th century. He further stated that the power plant had harmed these resources and thereby caused economic harm to Rhode Island’s fisheries. He also commented that the plant’s cooling system imposed costs to the environment and to commercial and recreational fishing and to all those who live nearby and enjoy the bay. (1035, 1132, 1133, 1075, 1208)

Response
EPA agrees with the commenters that BPS’s operations have contributed to the decline of the area’s fishery. EPA also agrees that this has had an effect on the area’s economy and on public enjoyment of the area’s natural resources. With fewer fish available for recreational and commercial fishing, fishing restrictions have been necessitated, and the Mount Hope Bay estuary ecosystem has suffered. EPA also agrees that reducing the power plant’s impact on the ecosystem is likely, together with other measures being taken (such as fishing restrictions and abatement of Fall River combined sewer overflows), to contribute to the recovery of the ecosystem. This, in turn, would benefit the area’s economy and restore to the public the beneficial uses of its natural resources.

Costs and Benefits

37. Comment

Many commenters stated that the Draft Permit should be complied with, noting that the resulting costs to ratepayers would be small and the resulting benefits to the health of the bay and ecosystem would be great. (1110)

Response
EPA agrees with these comments. Under CWA § 316(b), EPA prepared estimates of costs and benefits of complying with new cooling water intake limits in support of the Draft Permit. EPA believes those analyses were reasonable and appropriate. Nevertheless, EPA has revised its estimates of costs and benefits in response to comments on the Draft Permit. The revised figures are somewhat different from the earlier estimates, but EPA's overall conclusion remains the same. The cost to ratepayers is relatively small, the compliance costs for BPS are affordable, and the costs are not wholly disproportionate to the benefits under CWA § 316(b). Costs are not an authorized consideration for setting thermal discharge limits under CWA § 316(a).

38. Comment
The Town of Somerset Board of Selectmen stated that it felt the costs of complying with the permit were wholly disproportionate to the benefits, and the Town urged EPA to consider the cooling system proposed by the permittee as a first (and potentially only necessary) step. (1168, 1169)

Response
EPA certainly did carefully consider the cooling system proposed by the permittee. This is evident in the July 22, 2002, Permit Determinations Document. EPA disagrees that the costs of complying with the permit are wholly disproportionate to the benefits. EPA also notes that the wholly disproportionate costs test applies to intake limitations under CWA § 316(b), but not to thermal discharge limitations under CWA § 316(a) or any limits based on water quality standards.

C. Biology

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39. Comment
PG&E-NEG stated that the Draft Permit flows from the "flawed factual premise: that fish have declined to a greater extent in Mount Hope Bay than in Narragansett Bay."

Response
EPA disagrees with both points expressed in this comment. Available data indicate that such a differential decline has in fact occurred, and in any case, EPA did not base its Draft Permit on that differential decline. The Draft Permit does consider a finfish abundance analysis performed by Mark Gibson that highlights a statistical difference in abundance between fish stocks in Mount Hope Bay and stocks in Narragansett Bay. The differential patterns of abundance certainly suggest that there are site- specific factors affecting fish stocks in Mount Hope Bay. There is no question that this analysis played an important role in drawing attention to the issue of environmental decline in Mount Hope Bay. Independent of whether one believes the Gibson analysis to be correct, however, there is some basic factual information that has been clearly established. First, fish populations in Mount Hope Bay collapsed in 1984–85 and have remained at severely low levels of abundance since then. Second, BPS annually impinges and entrains large quantities of fish eggs, larvae, juveniles, and adults. Third, the current thermal plume from BPS covers virtually the entire surface of Mount Hope Bay at certain stages of the tide during the summer and fall, thus altering the bay's natural thermal regime and producing water temperatures that adversely affect resident species of fish.

These three facts, in conjunction with a variety of other data (e.g., presence of blue-green algal blooms, striped bass staying year round in the thermal plume, delayed migration and subsequent large impingement of Atlantic menhaden, mass mortalities of blue mussels, overwintering of the ctenophore *Mnemiopsis leidyi*, avoidance of much of the bay by adult winter flounder), show an ecosystem in peril. EPA's analysis of the available data suggests that impacts from BPS operations are significant contributors to the numerous changes observed in the Mount Hope Bay ecosystem. EPA's analysis of the thermal impacts is site-specific and based on data from Mount Hope Bay and the scientific literature. Additionally, the § 316(b) analysis attempts to put some of the entrainment and impingement losses into context by comparing losses to Mount Hope Bay population numbers. These analyses do not rely on comparisons with Narragansett Bay; they are sufficient on their own to support the limits in the Draft Permit. The differential decline of fish stocks in Mount Hope Bay only further justifies EPA's conclusion that reductions in thermal discharges and entrainment and impingement rates are necessary to protect the Mount Hope Bay ecological community.

40. Comment
PG&E-NEG stated that the Draft Permit is based on data of "questionable validity collected from only a small area of Mount Hope Bay."q

Response
EPA believes that the data underlying its assessment of fish abundance in Mount Hope Bay was collected in a scientifically sound manner and covers a representative area of the bay. The data that PG&E-NEG are referring to are trawl data collected by their own consultant, MRI. MRI has collected trawl data from 10 stations throughout Mount Hope Bay. PG&E-NEG has only recently questioned the validity of this data set based on their concerns with a change in sampling gear and some historic dredging in Mount Hope Bay. Neither PG&E-NEG nor MRI have presented any substantive information that would call into question the quality or validity of the trawl survey being conducted by MRI, thus EPA continues to believe it is an accurate representation of fish abundance in Mount Hope Bay.

Regarding the comment on the small area covered by the trawl survey, PG&E-NEG has estimated that this survey represents an area of approximately 5 square miles. EPA's interpretation of the MRI trawl survey is that this survey provides a good representation of the shallow (< 20 feet in depth) water areas of Mount Hope Bay, or approximately 9 square miles. Regardless of the discrepancy, EPA does not view 5 square miles of aquatic habitat as insignificant. It would be inconsistent with the CWA to allow the facility in this case to damage the biological community of even a 5-square mile area of an estuary, such as has resulted in Mount Hope Bay. Finally, Mount Hope Bay (especially the northern portion where the river systems enter the bay) has been a significant nursery area for a wide variety of invertebrate and finfish species. If the nursery and spawning locations for the impacted species are not protected, then there is limited hope of any meaningful recovery of the overall balanced indigenous population. Thus, EPA disagrees with PG&E-NEG's characterization of 5 square miles as being "small" and views this level of impact on a water body like Mount Hope Bay, particularly in a nursery area, as unacceptable. The current status of fish stocks in Mount Hope Bay and beyond only further supports the need to minimize the area of impact.

41. Comment
The permittee stated that Mount Hope Bay is only a "tiny part" of Narragansett Bay (14 square miles out of 146 square miles).

Response
EPA views 14 square miles of estuarine spawning and nursery habitat as a very important resource worthy of protection. See above response to comment.

42. Comment
The permittee stated that EPA acknowledges that thermal discharges from BPS do not reach Narragansett Bay waters.

Response
EPA has not stated that thermal discharges from BPS do not reach Narragansett Bay. To the contrary, EPA believes the data show that the BPS thermal plume reaches Narragansett Bay under some circumstances. Jack Mustard of Brown University publicly stated at the most recent New England Estuarine Research Society meeting, that satellite images have shown that, periodically, the thermal plume stretches from Mount Hope Bay into Narragansett Bay proper.

43. Comment
The permittee claimed that its consultants, as well as some independent experts, have "uniformly concluded" that fish populations have declined dramatically across the entire eastern seaboard, including Narragansett Bay. The permittee complained that "EPA states that BPS 'acknowledge[s] the dramatic decline of fish abundance in Mount Hope Bay in 1984 … [and that] the existence of a problem with fish populations in Mount Hope Bay is no longer in debate," but "BPS [only] acknowledges an **area-wide** decline in fish abundance . . . [and] does not agree that there has been a widespread differential decline in Mount Hope Bay or that the rate of decline in 1984 is itself significant."

Response
In response to the Gibson report, the owners of BPS initially disagreed that fish stocks in Mount Hope Bay had declined. Eventually, their position on the data changed and they acknowledged that fish stocks in Mount Hope Bay had in fact declined, but argued that this decline was part of a larger regional phenomenon. The intent of EPA's statement was to simply acknowledge the shift in position by BPS, and that the question of whether fish populations had or had not collapsed in Mount Hope Bay was no longer in debate.

44. Comment
The permittee stated that Collie and Delong are reputable scientists not affiliated with PG&E-NEG and they have concluded that fishery declines throughout Narragansett Bay have been steep; there has been no sign of recovery; and there are multiple reasons for this decline, with fishing, predators and global warming appearing to be major causes. The permittee also stated that Collie and Delong's work is supported by a September 17, 2002, presentation by Perry Jeffries, another scientist unaffiliated with PG&E, that concluded that winter flounder have declined by 96 percent in Narragansett Bay over the last 20 years.

Response
The work of these researchers does not conflict with EPA's conclusion that BPS is adversely affecting fish abundances in Mount Hope Bay. The Collie and Delong study divides Narragansett Bay into 11 discrete segments and examines age-specific mortality by geographic area. The authors list a suite of factors that are causing mortality to winter flounder, which include fishing, predators, and global warming, as well as the operations at BPS. Collie and Delong's opinion on the role of BPS is clearly articulated in their report:

> Although winter flounder substantially decreased in abundance throughout Narragansett Bay, they have decreased at a greater rate in Mount Hope Bay. There are some water quality issues that may be important in Narragansett Bay and Mount Hope Bay. However, the temperature rise and increased power plant flow in Mount Hope Bay may be of more concern. (Collie and Delong 2002).

EPA was not present at Jeffries' September 17, 2002, talk at the University of Rhode Island, though the Agency is familiar with his work in general. Jeffries was one of the first scientists to correlate small water temperature changes with winter flounder abundance. He noted that changes in winter water temperatures of as little as 1 ^{o}C, could result in dramatically reduced winter flounder abundance. BPS has been elevating water temperatures in Mount Hope Bay by approximately this amount for 35 years. The commenter stated that Jeffries concluded that winter flounder have declined by 96 percent in Narragansett Bay over the last 20 years. While EPA does not necessarily agree with this specific numerical value, EPA does agree that winter flounder abundance in Narragansett Bay has significantly declined over that period. This point does not contradict Collie and Delong's conclusion that flounder abundance in Mount Hope Bay has decreased at a greater rate and is being affected by BPS.

45. Comment

PG&E-NEG stated that its consultants have reviewed the data and have concluded that the decline in Mount Hope Bay fish is no different from that in Narragansett Bay, and that there is "no evidence" that BPS has "caused the decline." The permittee also states that there is no evidence that winter flounder are at as low levels as EPA calculates or that winter flounder density is different in Mount Hope Bay than in Narragansett Bay. The permittee further asserted that EPA's permit is based entirely on the conclusion that such a difference does exist between the two bays.

Response

At the outset, EPA must emphasize that the permit is not based entirely on the decline in the Mount Hope Bay fish abundances, much less on the premise that there has been a differential decline in fish stocks between Mount Hope Bay and Narranganset Bay. With that said, EPA has found compelling evidence that while the abundance of winter flounder in both bays is quite low, Mount Hope Bay has suffered a greater decline in winter flounder abundance than has Narragansett Bay, and thermal discharges and intake impingement at BPS have contributed to the decline. EPA has discussed this evidence in Chapters 6 and 7 of the July 22, 2002 Permit Determinations Document and elsewhere in this document. EPA gave careful consideration to scientific studies from a variety of sources, including PG&E-NEG's consultants. From these analyses, EPA concluded that significant reductions in BPS's thermal discharge and intake flows were necessary to protect the Mount Hope Bay fishery consistent with CWA requirements.

EPA also points out that the permittee carries the burden of proof when requesting a § 316(a) variance. Specifically, PG&E-NEG, as the applicant, must prove to EPA's satisfaction that the permit limits it requests will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on Mount Hope Bay. CWA § 316(a), 33 U.S.C. § 1326(a). As discussed in § 6.2.3 of the July 22, 2002, Permit Determinations Document, this burden of proof is quite rigorous. The principal Senate sponsor of the CWA, Senator Muskie, stated that only applicants "which could establish beyond any question the lack of relationship between federally established effluent limitations and that water quality which assures . . . the protection and propagation of a [BIP]" should receive a § 316(a) variance. L. History 1977, p. 642. PG&E-NEG has not met this standard for the variance-based limits it has requested. Indeed, there appears to be some disagreement among PG&E-NEG's own consultants regarding the abundance of winter flounder in Mount Hope Bay. For example, Ray Hillborn exclusively used impingement rates to calculate that, contrary to EPA's assertion of low winter flounder abundance, there are 300,000 winter flounder in Mount Hope Bay. Deborah French-McCay, also hired by PG&E-NEG, concluded that winter flounder abundance had remained low due to predation by cormorants. Meanwhile, Collie and Delong, whom PG&E-NEG cites as reputable, independent scientists, have indicated that operations at BPS likely played a role in the decline of Mount Hope Bay's winter flounder population.

46. Comment
PG&E-NEG said the Mount Hope Bay fishery will not recover even with the complete elimination of BPS. It stated that the fishery problem is regional and fishing restrictions will need to be enforced if the fishery is to recover. It further stated that the restrictions are not being enforced.

Response
EPA's goal is to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on Mount Hope Bay, which necessarily includes the recovery of the Mount Hope Bay ecosystem. Reductions in thermal discharges and entrainment and impingement at BPS play a critical role in achieving that goal. EPA acknowledges that other factors such as overfishing have contributed to the decline of the Mount Hope Bay fishery. However, it bears noting that these factors are being addressed. Severe fishing restrictions have been in place for Mount Hope Bay proper for a number of years, and within the last 5 years additional restrictions have been implemented in Narragansett Bay and offshore Rhode Island waters. Additional restrictions for fishermen catching winter flounder in Federal waters will likely be in place by spring of 2004 (Tom Nies, New England Fisheries Management Council, pers. comm.). These restrictions have resulted in a significant loss of revenue to commercial fishermen and retailers that support recreational fishing. PG&E-NEG contends that the fishing restrictions have not been adequately enforced. Whether or not this is true, EPA does not have jurisdiction to enforce fishing restrictions. EPA's role is to regulate BPS's operations in such a way as to protect the Mount Hope Bay ecosystem. Furthermore, the fact that fish abundances in Mount Hope Bay have failed to recover even after fishing restrictions have been in place and the City of Fall River has implemented improvements in its wastewater treatment suggests that overfishing is not the sole cause of the decline. EPA believes that for the Mount Hope Bay ecosystem to recover, significant reductions in thermal discharges and intake flows need to occur at BPS, in addition to compliance with fishing restrictions and continued improvement in wastewater and CSO treatment by the City of Fall River.

47. Comment
PG&E-NEG states that EPA's permit is based on the "erroneous legal and factual assumption" that BPS should be held accountable for the decline of winter flounder and other fish in Mount Hope Bay. PG&E-NEG further states that EPA's "error" stems from reliance on flawed studies by Mark Gibson of the RI DEM. PG&E-NEG asserted that EPA did not independently analyze the data underlying Gibson's studies. PG&E-NEG also stated that as early as 1995 BPS had asked Gibson to consider additional data in his analysis but he did not. PG&E-NEG also claimed that the agencies asked questions about a draft of Gibson's report that he never answered.

Response
EPA has responded to the legal aspect of this comment elsewhere in this document. Here EPA responds to the scientific aspect of the comment. The 1995 report from Mark Gibson expressed concerns regarding thermal impacts to Mount Hope Bay that agency scientists and biologists had been articulating repeatedly since the 1970s. The Administrative Record is filled with memos from various biologists who have worked on BPS re-permitting issues in the past, warning against raising the discharge temperature and allowing the conversion of Unit 4 to open-cycle cooling. It is fair to say that the 1995 Gibson report provided statistical support for what many agency scientists had been suspecting for quite some time.

Upon receiving the 1995 Gibson report, EPA sent it out for peer review. Gibson also sent his report out to approximately a dozen colleagues for peer review, and members of the Brayton Point TAC reviewed it as well. Consultants hired by BPS also reviewed it. In total, over 25 reviewers provided comments on this document. The vast majority of the reviewers had only minor comments. All of the independent reviewers (i.e., those not hired by BPS) agreed with the major conclusions of the report. Gibson did issue a revised version of this report in 1996 responding to the majority of the comments he was given. He responded to the substantive comments and did not change the final conclusions in the report. EPA saw that the report and its conclusions withstood a substantial amount of scrutiny from a diverse audience. EPA thus believed it supported, along with other available information, requiring substantial reductions in thermal discharges and cooling water withdrawals from BPS.

48. Comment
PG&E-NEG complained that prior to issuing the draft report EPA did not review "three short, concise reports" submitted by its hired expert regarding Narragansett Bay marine biology and its hired expert on fish population dynamics that explained certain flaws in Mark Gibson's work.

Response
EPA did not have the opportunity to review and comment on these reports prior to issuing the Draft Permit because it received them when EPA's Draft Permit was about to be issued. The technical reports came in on July 2, 2002; EPA issued the Draft Permit on July 22, 2002. EPA indicated that it would consider these reports as comments on the Draft Permit and address any issues raised by them in the response to comments document. EPA believed this approach was appropriate given the ample opportunity that PG&E-NEG had to address the Gibson report before EPA issued its Draft Permit. The Gibson report had been out since 1996 and had been thoroughly reviewed by numerous scientists. Moreover, EPA had been developing the Draft Permit for several years before issuing it. PG&E-NEG therefore had more than sufficient time and opportunity to raise its concerns regarding the Gibson report.

49. Comment
PG&E-NEG said it provided impingement data on all fish, vegetation, and other organisms trapped on the intake screens. It stated that entrainment data were collected "year round" from 1972 to 1985 and since 1992 has been collected every few days between February and May. In addition, PG&E-NEG stated that the monthly "MRI original trawl" data set has also been collected since 1972 and covers the 5 square miles nearest the plant.

Response
EPA notes that BPS has been monitoring the type and quantity of organisms that end up on their intake screens to Units 1, 2, and 3. Currently, BPS does not monitor impingement on the intake from Unit 4. It also collects limited entrainment data exclusively for winter flounder. It does conduct a trawl survey, though it is debatable what area that survey represents. At a minimum, it represents 5 square miles, but EPA believes it is representative of the shallow water (< 20 feet deep) habitat in Mount Hope Bay. This shallow water habitat is approximately 9 square miles in area.

50. Comment
PG&E-NEG stated that all the data show that the entire Narragansett Bay ecosystem has experienced a steep decline in demersal fish since at least the mid-1980s and that fish have not recovered anywhere in this ecosystem. The permittee wrote that there are multiple plausible explanations for this and no identified single cause. PG&E-NEG stated that "each and every scientist" agrees that this problem is regional in scope, that overfishing is a big part of the problem, and that fishing must be better managed in order to permit a recovery. The permittee stated that these regional fishery problems exist not only in Mount Hope Bay but also in Narragansett Bay, southeastern Massachusetts waters, and Peconic Bay in New York. The permittee also stated that Mark Gibson is the only scientist who believes that there has been any recovery of fish populations anywhere in Narragansett Bay, and that EPA mistakenly relied on Gibson's report of a slight recovery. The permittee argued that the data indicated a slight recovery only in 1995 and 1996 and that since that time population levels have receded to, and remained at, an all-time low. The permittee cited to a report by Collie and Delong (July 2002).

Response

Most scientists would agree that fishing mortality is an important part of the population dynamics for winter flounder and tautog. However, most scientists would also agree fishing mortality for hogchoker and windowpane should be fairly negligible, yet these species collapsed as well. Thus, regional fishing mortality alone cannot explain the collapse of all the species in Mount Hope Bay. Other site-specific stressors are likely more important.

The most recent winter flounder stock assessment for the Southern New England/Mid-Atlantic region shows that stock spawning biomass bottomed out in the early to mid-1990s and has shown a modest recovery from 1996 to 2001 (Figure 6). This regional trend is not reflected in abundance trends in Mount Hope Bay, where winter flounder abundance continues to “flatline.” This suggests that site-specific stressors are also affecting winter flounder abundance. Collie and Delong (2002) make this exact point in their report. They acknowledge the importance of the larger regional stressors, such as fishing mortality and long-term temperature rise, but also state that site specific stressors, such as BPS, are critical to winter flounder abundance in Mount Hope Bay.

Finally, EPA’s permit does not rely on the recovery of winter flounder in Narragansett Bay in the mid-1990s, though the lack of a similar recovery in Mount Hope Bay does support its conclusion that site-specific factors in Mount Hope Bay are controlling fish abundance.

Collie, J.S. and A.K. DeLong 2002. Examining the decline of Narragansett Bay winter flounder Final Report to RI DEM Division of Fish and Wildlife. 150 pp.

51. Comment

PG&E-NEG claimed that EPA’s Draft Permit is based on the Agency erroneously concluding that a correlation between the modification of Unit 4 at BPS and the fishery collapse must mean that the modification **caused** the collapse. The permittee argues that “Gibson’s theory of parsimony” embodies that error, and that EPA makes the same error. The permittee stated that coincidence does not equal causation. Moreover, it stated that the supposed coincidence did not even occur.

Response

PG&E-NEG incorrectly characterized EPA’s analysis. Neither EPA nor Gibson have made the assumption that PG&E-NEG suggests. Both EPA and Gibson, in his report, recognize that the correlation in time between the significant increase in plant operation (cooling water flow and heat rejection) and the significant decrease in fish abundance does not prove a cause-and-effect relationship. From a purely scientific perspective, the only way to prove that BPS is causing a fishery decline in Mount Hope Bay would be to shut the plant off, wait for the fish populations to recover, and then monitor changes in fish abundance after turning the plant back on. Absent such an experiment, EPA must rely on existing scientific studies, which have collectively led EPA to conclude that BPS has had a significant negative impact on the Mount Hope Bay fishery.

PG&E-NEG is also incorrect in denying the coincidence in time between the increase in plant operations and fish abundance. It is quite clear from plotting cooling water flow versus fish abundance that there is a correlation in time. See Figure 7. Finally, EPA could not identify other factors that could affect fish population abundance over such a widespread area for such a long period of time. Eliminating other possible causes does not establish cause and effect in regards to plant operation, but it certainly strengthens the case that the facility is reasonably likely to be at least partially responsible for the decline.

52. Comment

PG&E-NEG stated that EPA should base its permit on the limits proposed by the permittee because BPS currently has only a small adverse environmental effect in a confined area, and with the reductions in thermal discharge and cooling water intake flow that it proposes, any remaining adverse effects would be negligible. The proposed reductions would, the permittee stated, reduce thermal discharges and intake volumes to the levels prevailing in 1970. The permittee further stated that there is no legitimate claim that the Mount Hope Bay fishery was suffering in 1970 and that 1970 is approximately 15 years before the Unit 4 conversion that Mark Gibson concluded precipitated the collapse.

Response
EPA disagrees with these comments for several reasons. First, EPA disagrees that the impact is small or confined. Fish populations have collapsed throughout most of Mount Hope Bay. In addition, a host of thermally induced environmental changes have occurred in the Bay. These changes are discussed in Chapter 6 of the July 22, 2002, Permit Determinations Document and elsewhere in this document. EPA does not consider these circumstances to represent a small adverse environmental effect in a confined area.

Second, simply put, the path of the recovery of an ecosystem might not trace the path of the decline. In other words, once populations decline to a certain low level, more extreme measures may be needed to promote a recovery. As an example, consider winter flounder populations in Mount Hope Bay. As stated in EPA's § 316(a) and (b) analysis, winter flounder populations are subject to numerous sources of stress. Fishing mortality, plant-induced losses, and natural mortality all play a role in determining long-term population trajectories. The cumulative losses might change from year to year, depending on fluctuations in any and all of the individual stressors. Fishing and plant operations can be regulated, but natural mortality, such as predation losses, cannot be reduced by regulation. PG&E-NEG have commented that predation by cormorants and sand shrimp has increased through time and might be an important factor in winter flounder abundance in Mount Hope Bay. Increases in natural mortality do not alter the CWA requirements to assure the protection and propagation of the BIP.

It is EPA's judgement that both significant reductions in fishing mortality and power plant-related mortality are required to induce a recovery of the Mount Hope Bay system. The control of BPS operations includes both the reduction in entrainment and impingement losses, and the reduction in thermal discharge and subsequent improvement in habitat quality. Fishing restrictions are already in place, as discussed elsewhere in this document.

53. Comment
PG&E-NEG's comments criticized the scientific work by Mark Gibson of the RI DEM. The permittee stated that concern over the Mount Hope Bay fishery began with Gibson's study in 1996 which triggered an "understandable groundswell of concern" by regulatory agencies and fishermen over the health of the ecology of the bay. The permittee argued, however, that Gibson's 1996 report lays the blame on the conversion of Unit 4 from closed-cycle to open-cycle cooling, but that now Gibson writes that fish populations were already declining to a differential degree as compared to Narragansett Bay from 1972 to 1985, even before the Unit 4 conversion. The permittee stated that Gibson has more recently concluded that Mount Hope Bay's winter flounder population had a historical high of 380,000, but has now declined to around 7,428. From these numbers, the permittee maintained, EPA has extrapolated to its conclusion that the power plant takes 80 percent of the bay's winter flounder.

Response
EPA's interpretation of finfish abundance changes in Mount Hope Bay is based on Gibson's 1996 report, the comments of peer reviewers on that report, input from the TAC, and EPA's own interpretation of the data. The dramatic decline in winter flounder abundance in the 1984–85 time frame is the most obvious feature of Figure 7, which plots winter flounder abundance in Mount Hope Bay through time. However, it is EPA's opinion, and this has been shared by other reviewers of Gibson's 1996 report, that winter flounder populations show a general decline from 1972 to 1984. This general decline is characterized by

dramatic abundance swings that can be interpreted as an unstable population. EPA believes that winter flounder populations were declining and unstable prior to the increase in plant operation in 1984, but the conversion of Unit 4 to open cycle cooling was the final straw for a population already in trouble.

The number of winter flounder in Mount Hope Bay is a general point of interest as it provides an important comparison for entrainment and impingement losses. PG&E-NEG has consistently compared entrainment and impingement losses to the commercial landings of winter flounder for the entire state of Rhode Island. From an ecological perspective, this comparison makes little sense. Due to the high fidelity of winter flounder to their natal spawning sites (demonstrated by a RI DEM tagging study and supported by several published scientific papers), it is more appropriate to compare plant mortality rates to discrete Mount Hope Bay populations. Gibson used five different methods to determine a pre-1984/85 winter flounder population level. Using this pre-1984–85 estimate and the MRI standard trawl series as a scaler, Gibson derived an estimate of average winter flounder abundance of 7,500 fish for the years 1992–1999. The years 1992–1999 were used to match PG&E-NEG's entrainment sampling and estimate of entrainment and impingement losses. For winter flounder, entrainment and impingement losses totaled approximately 30,000 Age 3 adult equivalents. Thus, if the plant takes 30,000 adults and 7,500 are left in the bay, that equates to a total population of 37,500 fish. The plant's take is approximately 80 percent of the adult population. EPA acknowledges that there is some variability associated with these estimates, so the exact number of fish in the bay might be somewhat larger or smaller. However, the general point is that BPS takes a disproportionate number of winter flounder from the Mount Hope Bay system and in order to assure the protection and propagation of the BIP, these losses need to be significantly reduced.

54. Comment
PG&E-NEG stated that its consultant Ray Hilborn has refuted the analysis by Mark Gibson that EPA's analysis is based on. According to the permittee, EPA has concluded, based on the Gibson analysis, that a 26 percent loss of Mount Hope Bay's winter flounder would occur as a result of EPA's proposed permit limits based on closed-cycle cooling for all four units and that this would be acceptable. Yet, PG&E-NEG stated that its more accurate analysis shows that its proposed permit limits based on the Enhanced Multi-Mode technology approach would result in a loss of only 5 percent of the bay's winter flounder population. The permittee argued, therefore, that this should be acceptable to EPA.

Response
EPA does derive an estimate that closed-cycle cooling would still result in a loss of 26 percent of winter flounder in Mount Hope Bay. EPA does not judge this to be acceptable and if continued it would likely interfere with the long-term recovery of winter flounder in Mount Hope Bay. It simply acknowledged the impact, and recognized that BPS will likely not be able to significantly improve upon that level by further technological fixes. Also, as the winter flounder population recovers in response to the Final Permit, and other measures, the percent loss will drop well below 26 percent. Additionally, EPA recognizes that there are other sources of mortality on winter flounder (i.e., fishing, predation). Changes in mortality rates for these stressors need to be considered as well. It has always been EPA's contention that continued strict fishery regulations, as well as enhanced pollution control at BPS are needed to stimulate a recovery of winter flounder stocks. EPA disagrees with PG&E-NEG's modeling efforts that produce a loss of 5 percent of the winter flounder in Mount Hope Bay. The details of this are discussed below. Moreover, EPA would view the taking of 5 percent of the winter flounder population and large quantities of other species as an adverse impact that warrants minimization. Finally, EPA's permit limits are based on more than just impacts on winter flounder.

55. Comment
PG&E-NEG stated that EPA apparently rejects its studies because they were performed by consultants hired by the company. The company claimed that statements by EPA at public meetings describing the permit support its contention.

Response

EPA has never made any statements disparaging the work produced by PG&E-NEG or its consultants based solely on the origin of that work. EPA has spent well over 20 years working with some of PG&E-NEG's current consultants. The Agency carefully considers each analysis or piece of information that is submitted to it, independent of the source. If skepticism was expressed about the work produced by consultants to PG&E-NEG at the public hearing and our public information sessions, those comments were made exclusively by members of the public.

56. Comment

PG&E-NEG commented that its consultant Joseph DeAlteris analyzed the data and found that the winter flounder decline in Mount Hope Bay was "generally" no different from that found in Narragansett Bay. The permittee stated that DeAlteris found "fundamental errors and omissions in the data" used by Gibson. The permittee argued that these errors include the following:

a. Gibson's analysis "mistakenly (and misleadingly)" used only the MRI standard trawl data from the "upper one third of the bay" and treated them as representative of the whole bay.

b. Gibson "ignored" the RI DFW's own, extensive data set on the lower bay that has been collected since 1979.

c. Gibson "incorrectly (and misleadingly)" included in his "comparative analysis" trawl samples from Rhode Island Sound and Block Island Sound, but should not have because these are offshore waters that are not part of Narragansett Bay and represent entirely different habitat types. Gibson inappropriately used this data as if they represented Narragansett Bay. The permittee stated that the offshore data "cannot properly be compared with data collected in either Mount Hope Bay or Narragansett Bay."

d. Gibson incorrectly used impingement data in his analysis that had not been adjusted for flow and that this renders the data "meaningless." The permittee asserted that the proper analytical metric is the number of fish impinged "per unit of flow, not the total number of impinged fish"

e. PG&E-NEG stated that DeAlteris "corrected" Gibson's data errors by dropping the Rhode Island Sound and Block Island Sound data and using "corrected" impingement data. He then compared Narragansett Bay abundance trends to the three data sets available to represent Mount Hope Bay abundance (i.e., the MRI standard trawl, the impingement data, and the Wilcox trawl data). The permittee stated that DeAlteris' results "definitively refute Gibson's conclusion of a large-scale difference in fish trends and fish densities between Mount Hope Bay and Narragansett Bay."

Response to a and b

The MRI trawl survey includes a sampling station below (i.e., south of) Spar Island (Figure 8). EPA calculated the proportion of the bay represented by the MRI sampling if a straight line is drawn across the bay at the approximate location of the Spar Island sampling station and at 90 degrees to the eastern shoreline. All MRI sampling using the standard trawl took place north of this line. Thus, MRI data should be representative of the area of the bay north of this same line. Using this simple areal delineation, EPA finds that 55 percent of the bay, rather than the DeAlteris estimate of 33 percent, is represented by the MRI standard trawl. DeAlteris appears to have inappropriately used the Massachusetts/Rhode Island state line in his estimation of the proportion of the bay represented by the MRI sampling, apparently ignoring the location of the MRI standard trawl station south of Spar Island.

Second, if the MRI stations are used in conjunction with depth information, and if spawning stock flounder densities are stratified by depth (as they appear to be), then the MRI data more likely can be used as estimators for winter flounder abundance for most of Mount Hope Bay (about 9 square miles).

Third, winter flounder have an affinity for spawning near sources of freshwater input at the head of Mount Hope Bay. Other surveys do not sample the upper portion of the Bay; thus the MRI standard trawl is the best indicator of the reproducing adult population of flounder in Mount Hope Bay.

The MRI standard trawl index appears to be the best indicator of winter flounder populations in Mount Hope Bay based on statistical grounds as well. Judging from Gibson's analyses, prior to the collapse of this population, the MRI trawl survey sampled a full-size range of winter flounder. The survey in current form makes over 100 tows per year compared to 24 for the RI DFW monthly fixed-station survey at Spar Island and RWC or the average six tows per year in Mount Hope Bay for the RI DFW random spring-fall survey cruises. Gibson's analyses of RI DFW trawl and seine survey data show that survey precision improves as sample size increases, with precision reaching acceptable levels at 40 to 50 tows per year. Thus, population size estimates made using the MRI data should be the most precise of all the surveys.

Response to c

The goal of the Gibson (2002a) study was to separate local and regional factors that influenced winter founder abundance. This was done to clarify the role of BPS in the background of fishing mortality, increases in water temperature, enhanced predation, among other factors. Gibson (2002a) emphasize the need for adequate control data in the before-after control impact (BACI) design, and also stressed the need for control replication. Krebs (1989) reviewed this topic in his Chapter 8 on experimental design. He defines a control as "an experimental unit that has been given no treatment." In the context of the Gibson (2002a) study this means no power plant impact, and thus Gibson used survey data far from the plant for a control.

DeAlteris, on the other hand, removed data from stations in Rhode Island coastal waters and analyzed only the Narragansett Bay subset of RI DFW trawl data. He purported to show that trends in abundance of winter flounder in Mount Hope Bay were not very different from that in greater Narragansett Bay. By shifting the location of control samples closer to BPS and Manchester Street Station, DeAlteris muddies the comparisons and ensures that station impacts will be more difficult to detect. That is, the controls are contaminated by power plant effects.

BPS might also have impacts on greater Narragansett Bay. Based on tagging studies, winter flounder that spawn in Mount Hope Bay later migrate through portions of Narragansett Bay into cooler coastal waters (Saila, 1962; Powell, 1992). Losses of adult winter flounder through BPS impacts reduce the adult migratory stock available for harvest in these areas. The company implicitly accepts this because it calculates equivalent adult losses from entrainment casualties at BPS and compares them to fishery landings data for the entire state.

Literature Cited:

Gibson, M.R. 2002a. Winter flounder abundance near BPS, Mount Hope Bay revisited: separating local from regional impacts using long-term abundance data. RI Division Fish and Wildlife Research Reference Document 02/1.

Krebs, C.J. 1989. *Ecological Methodology*, Harper and Row, Publishers, New York. 654 pp.

Powell, J.C. 1992. Winter flounder population assessment. Performance Report, F-26-R-26, Job VI-1. RI Division of Fish and Wildlife.

Saila, S.B. 1962. Proposed hurricane barriers related to winter flounder movements in Narragansett Bay. *Trans. Am. Fish. Soc.* 91:189-195.

Response to d

In a report from Gibson, August, 2002, the author questioned the BPS impingement index as a reliable measure of winter flounder abundance and EPA finds his argument compelling: "It is not based on a rigorous statistical design but rather is a sampling of fish trapped on the revolving screens located at the intake structures. Because the sampling is only at one station which was not assigned randomly, the sample design lacks randomization and replication design elements." Thus, there is no basis for inference and no basis to assess variability. Further, a comparison of length frequency data from trawl and impingement catches shows that impingement samples are biased toward small fish (Figure 9). This likely occurs because of differences in screen (0.375") and trawl (1.5") mesh but also because of a difference in water velocity at the screens and through the otter trawl. Whereas water velocities at the screens range from 0.5 to 1.6 fps (US Gen 2001a), the standard trawl is pulled at 4.2 fps. Maximum swim speed in fish is known to be a power function of body size (Peters 1983). Considering his published relationships for maximum and optimum speeds as a function of body mass (flounder would be intermediate performers), station screen velocities will approach or exceed those estimated for young-of-the-year and Age-1 flounder. Trawl velocities exceed maximum speeds of all sizes of flounder except those approaching their maximum theoretical length (>40 cm). Since the reproducing adult stock showing fidelity to Mount Hope Bay is the population of concern, the standard trawl survey is the preferred index.

Literature Cited:

Gibson, M.R. 2002a. Winter flounder abundance near BPS, Mount Hope Bay revisited: separating local from regional impacts using long-term abundance data. RI Division Fish and Wildlife Research Reference Document 02/1.

Response to e

Personnel from the RI DFW found that there were errors in the data series reported by DeAlteris from RI DFW trawl survey records. In Table 2 of the DeAlteris report, a flounder abundance index is provided for lower Mount Hope Bay from the RI DFW trawl survey. RI DFW personnel reviewed their computer database and trawl logs but could not replicate the DeAlteris numbers for Mount Hope Bay (Figure 10). Average absolute error between the DeAlteris values and the RI DFW numbers exceeded 100 percent. Because of this, EPA can have no confidence in the DeAlteris correlation and time trend analyses.

Problems associated with the impingement analysis have been stated above. Those associated with the PG&E-NEG analysis using the Wilcox trawl are reviewed below.

Gibson, M.R. 2002a. Winter flounder abundance near BPS, Mount Hope Bay revisited: separating local from regional impacts using long-term abundance data. RI Division Fish and Wildlife Research Reference Document 02/1.

57. Comment

PG&E-NEG stated that EPA "admits" that "if regional factors were responsible for the decline, then trawl abundance curves would look similar." The permittee stated that DeAlteris has "conclusively demonstrate[d] that the abundance curves for Mount Hope Bay and Narragansett Bay **do** look similar."

Response

EPA disagrees. If regional factors were solely responsible for changes in abundance, then abundance curves between Narragansett Bay and Mount Hope Bay would be **identical.** However, there is a statistically significant difference in abundance between the two waterbodies and thus the trawl abundance curves are not identical. This suggests that a site-specific factor is responsible for creating the difference.

58. Comment

PG&E-NEG stated that DeAlteris has found that

a. There are no significant differences in abundance trends for any species between Narragansett Bay and the lower 9 square miles of Mount Hope Bay (as measured by the RI DFW trawl data).

b. There are no significant differences in abundance trends for any species between Narragansett Bay and the upper 5 square miles of Mount Hope Bay (as measured by impingement data).

c. There are no significant differences in abundance trends for most species between Narragansett Bay and the upper 5 square miles of Mount Hope Bay (as measured by the MRI standard trawl). The only evidence of a difference in abundance trends for the two bays is between the MRI standard trawl data for winter flounder and scup in the winter of 1985–1986. Data were equivocal with respect to two species in the upper one-third of Mount Hope Bay. For other species there is no significant difference in abundance trends at any time between 1972 and 2000, regardless of which data set is used to represent Mount Hope Bay.

d. There were no significant differences in the density of fish collected by the Wilcox trawl in Mount Hope Bay and in Narragansett Bay from 1997 to the present.

e. There is no evidence of a pre-1984 decline in Mount Hope Bay any different from Narragansett Bay, or that Mount Hope Bay flounder populations were "unstable" or "prone to collapse," as EPA states. The permitee also argued that EPA's sole support for its contention in this regard is a 1996 letter from Delbert Hicks in which the point is stated but not substantiated.

Response to a

First, the EPA points out that the area south of Spar Island is not 9 square miles, which would be about 64 percent of the Bay. The area below the bay as represented by sample stations below Spar Island is about 6.3 square miles, or about 45 percent of the bay (see responses above).

Conclusions drawn by DeAlteris through the analysis of the RI DFW trawl data are an important component of the DeAlteris analysis and it is imperative that one understands the assumptions behind the comparisons. DeAlteris used both RI DFW stations (Spar Island and RWC) to represent the lower Mount Hope Bay basin. One of these near Spar Island is a shallow water station. The other, RWC, is a very deep station (approximately 55 feet), near the outlet of Mount Hope Bay, and is the only area of Mount Hope Bay that appears to have an abundance of adult winter flounder.

The average depth of Mount Hope Bay is 18 feet. The depth of the RWC station is about 55 feet. Only about 5 percent of the bottom area in Mount Hope Bay is at the same or at lower depths than that at the RWC station (Chinman and Nixon, 1985). It appears that the RWC (deep) station area might be a cool water refuge for winter flounder during the warmer months (Figure 11). The RWC deep hole is connected to upper Narragansett Bay and the Sakonnet River via deep channels and it is possible that some of the relatively abundant flounder here are not of Mount Hope Bay origin. Therefore, if high temperatures are affecting bottom water temperatures over much of Mount Hope Bay, which is relatively shallow, it is inappropriate to select data from a deep hole with cooler water to represent the benthic community in Mount Hope Bay. The MRI trawl data and RI DFW data from Spar Island are the most representative of the majority of Mount Hope Bay. Also see response to comments below.

See also discussion above regarding the MRI standard trawl data as the best indicator of the reproducing adult population of flounder in Mount Hope Bay among the different surveys. Among the surveys, the MRI standard trawl is preferable on statistical grounds. Based on the above information, it appears inappropriate to use the two RI DFW stations (two samples per year) to typify the benthic population in

Mount Hope Bay below Spar Island. Because statistical power is a function of sample size, the ability to detect real changes will be fairly low if the RI DFW stations are compared to other more robust surveys.

Literature Cited:

Chinman, R.A. and S.W. Nixon. 1985. Depth-area-volume relationships in Narragansett Bay. Graduate School of Oceanography. The University of Rhode Island. NOAA/Sea Grant Marine Technical Report 87.

Response to b
This comment is addressed above.

Response to c
The RI DFW compared RI DFW Mount Hope Bay Winter Flounder Indices reported by DeAlteris to a data set recomputed by the RI DFW Agency from the Survey database and trawl logs. There were discrepancies between the two data sets of over 100 percent. Thus, it appears that the DeAlteris database was flawed and any conclusions that can be drawn from his comparisons would also be flawed.

As noted above, the MRI data should be appropriate to characterize about 55 percent (not 1/3) of the bay if a simple areal delineation is used by drawing a line across the bay slightly south and west of the bay at 90 degrees to the eastern shoreline. If the MRI stations are used in conjunction with depth information, and if spawning stock flounder densities are stratified by depth (as they appear to be), then the MRI data more likely can be used as estimators for winter flounder abundance for about 9 square miles of the bay (over 64 percent of the bay).

The 1984–87 time period is important because of the substantial downward trend in abundance in the MRI data set during that period. Any trend analyses conducted for Mount Hope Bay should not be conducted in the absence of data from this period. DeAlteris concedes that when this period is included in the trend analysis, winter flounder abundance trends from this more northerly section of the bay do show a decreasing trend when normalized by other trawl data from regional databases.

Response d
In Attachment II.B, Lawler, Matusky, & Skelly Engineers LLP (LMS) compares the densities of winter flounder (approximated with catch per unit trawl effort (CPUE) data) in three non-random portions of Narragansett Bay that LMS designates as “upper Mount Hope Bay,” “lower Mount Hope Bay,” and “Narragansett Bay.” LMS arbitrarily chose the Rhode Island/Massachusetts political boundary as the delineation between “upper” and “lower” Mount Hope Bay, irrespective of important factors such as hydrodynamic or ecological differences between these regions. The “Narragansett Bay” samples are represented by only two trawl sites (Warren River and Ohio Ledge) in the uppermost reaches of Narragansett Bay and therefore cannot be taken to be representative of winter flounder densities throughout most of Narragansett Bay.

LMS used an Analysis of Variance (ANOVA) model to compare CPUE data across the three regions and between two depth categories arbitrarily chosen as trawls < 20 feet deep and trawls > 20 feet deep. LMS assigns the trawl data from the Ohio Ledge site to the “deep” category and data from the Warren River to the “shallow” category. According to NOAA Chart 13221 “Narragansett Bay,” Ohio Ledge depths range from 8 to 18 feet and depths in the area of the Warren River as described in Fig. II. B-2 are 5 to 20 feet deep. Thus, it is not clear why LMS assigned the Ohio Ledge trawl site to the “deep” category and the Warren River site to the “shallow” category. The lack of a real difference in depths between the two areas calls into question the validity of the LMS comparisons between “deep” and “shallow” areas.

LMS concluded from its analysis that the "mean CPUE of winter flounder in upper Mount Hope Bay, as measured by Wilcox trawl, was not different from that measured in lower Mount Hope Bay and Narragansett Bay." LMS further stated that the "results demonstrate that winter flounder abundance in upper Mount Hope Bay has not been differentially depleted as a result of BPS (BPS) operations."

There are several flaws in the LMS statistical design and analysis of the Wilcox trawl data that preclude LMS from making any scientifically defendable statements about winter flounder abundance in the three regions or the importance of BPS to any real differences in abundance that might exist across the greater Narragansett Bay.

First, what LMS has presented Attachment II.B is an *a posteriori* analysis, not specifically designed to compare these three regions. An appropriate *a priori* statistical design would have included equal sampling effort across all stations. LMS provides no data describing the sample sizes for each of the regions. One is left to infer from Figures II. B-1 and II. B-2 in the LMS report, that only one trawl sample was collected in each year at the Warren River and Ohio Ledge sites, while multiple trawl samples were taken at the Mount Hope Bay sites. The inequality in sampling sizes contributes to heterogeneity of variances across the three regions, a constraint that precludes the use of parametric tests such as ANOVA, as discussed below. Low sample sizes could also have contributed to the low statistical power (the ability to detect a difference when it does in fact exist) of the analysis. For example, the power to detect differences among the three study regions is so low that even if a difference existed, the LMS analysis would have had a low probability of detecting it. EPA's ability to detect a difference between sites, in the three cases mentioned, ranged from 10 percent to about 38 percent.

Low power is a result of a low number of samples, but also a result of high variability in sample results. According to M. Scherer (Szal, pers. comm., 2003), winter flounder catch per tow in the year 2000 in the shallow stations in Mount Hope Bay ranged from zero to eight. (six shallow stations). Sampling was conducted once per month. In February no winter flounder were caught at any of the sites; in May, zero to eight fish/tow were captured. In Narragansett Bay very few fish were caught in the shallow station (only one station); typically zero to one. In both Mount Hope Bay and Narragansett Bay, deep stations provided a much wider range in numbers of fish.

Secondly, LMS inappropriately uses the ANOVA model. In order to use an ANOVA model to compare responses among groups, two conditions must be met. First the responses (in this case CPUE) must have a "normal" distribution. The fact that LMS transformed the CPUE data as ln[CPUE+1] would lead one to believe that the data were not normal. However, LMS never describes whether or not the test for normality was performed on the data and if the normality requirement was met with the ln transformation. If the ln-transformed data are not normal, it is totally inappropriate to be using the parametric ANOVA test. The nonparametric Kruskal Wallace test is the alternative analysis (Sokal and Rohlf 1981). The second assumption that must be met in order to use the ANOVA model appropriately is that the variances among the different groups (regions or depths) must be homogeneous. The test for homogeneity of variances is a basic component of any ANOVA software so it is not clear why LMS did not include this information. Once again, if the homogeneity of variances assumption is not met, the ANOVA model is inappropriate. One quick way to test for homogeneity of variances is to use the F_{max} test (Sokal and Rohlf 1981). This test calculates the ratio of the maximum variance in a group to the minimum variance in a group and compares this ratio to the F_{max} Table. EPA calculated the F_{max} for the data presented in Table II.B-2. F_{max} for the "Shallow", "Deep", and "Shallow or Deep" comparisons are 13.7, 14.7, and 52, respectively, all of which are significant at the $p < 0.05$ level, meaning that the variances within the groups of these comparisons are **not** homogeneous and the ANOVA model is inappropriate. An alternative analysis is the "approximate test of equality of means" using the Games and Howell Method (Sokal and Rohlf 1981). As stated above, it is likely that the unequal sample sizes among groups, a flaw in the LMS experimental design, led to unequal variances among groups.

Third, EPA can say with certainty that two stations in Narragansett Bay cannot give a representative perspective of winter flounder populations in Narragansett Bay.

In summary, LMS has used inappropriate stations (no "deep" station in Narragansett Bay), too few number of stations to represent Narragansett Bay, a weak statistical design, and the wrong statistical test in its comparison of Wilcox trawl catches. Further, had LMS used the appropriate statistical analysis, the study likely would still have suffered from low power, thus preventing the analysis from detecting actual differences had they existed. Without the appropriate statistical design and analysis, the LMS report provides no valid, scientifically supportable information to add to the discussion of why winter flounder abundance in Mount Hope Bay is severely depleted over historical abundances.

Literature Cited:

Sokal, R.R. and F.J. Rohlf. 1981. *Biometry*. W.H. Freeman and Company, New York, NY, 859 pp.

Response to e

Gibson stated that although Van Winkle, *et al.* (1981) found that impingement indices were of limited value in detecting abundance changes and that trawl-survey data had been shown superior over fishery dependent data, he considered impingement data in the cited study. Gibson compared impingement rates from the Manchester Street Station to those from the BPS and found that impingement rates of winter flounder at the BPS have decreased steadily since 1972 and remain low. By comparison, those at the Manchester Street Station did not appear to follow either a downward or upward trend over the same approximate time period. Gibson used annual impingement rates as reported by BPS. This data merely consists of the number and types of fish impinged over some predetermined sample time. This result is extrapolated up to an annual total. This extrapolation can be done using time or flow. Thus, if one were to sample impingement rates for a week, one could multiply the results by 52 to calculate an annual total. A second approach would be to measure the flow for the week and extrapolate based on the total annual flow for the plant. Because BPS is a baseload plant and runs fairly consistently, either approach should produce comparable results.

Literature Cited:

Gibson, M.R., 2001. Winter flounder abundance near BPS, Mount Hope Bay.

59. Comment

PG&E-NEG stated that Collie and Delong (2002) support the permittee's conclusions because they partitioned the RI DFW trawl data into specific units and in the "spring survey" for "lower Mount Hope Bay" found no significant decline in winter flounder in Mount Hope Bay.

Response

Collie and Delong (2002) conclude that BPS is impacting winter flounder populations in Mount Hope Bay. For additional detail, see above.

Collie, J.S. and A.K. DeLong 2002. Examining the decline of Narragansett Bay winter flounder Final Report to RI DEM Division of Fish and Wildlife. 150 pp.

60. Comment

PG&E-NEG stated that contrary to the "Gibson hypothesis," the increase in flow and heat from the July 1984 conversion of Unit 4 from closed-cycle to open-cycle cooling did not actually occur until 1987 because other units were out of service or operating at reduced loads during that period. The permitee asserts that EPA's own analysis shows this. According to the permittee, the steep decline in the 1985–86 MRI standard trawl occurred **before** the thermal discharge and intake flow increases associated with the

Unit 4 conversion. Therefore, the permittee argued that BPS could not have caused the steep decline. The permittee further stated that the "Gibson hypothesis" is undermined by DeAlteris' work because while Gibson argues that the impact of the Unit 4 conversion is evidenced by a differential decline in the fish populations of Mount Hope Bay and Narragansett Bay, DeAlteris argues that his work shows there was no such differential decline. The permittee asserted that if there was any differential decline at all it occurred only for certain species in the winter months of 1985–86, but there was no increase in thermal discharge or water withdrawals during those months or, with one exception, in the prior 6 months. The permittee stated that while there was an increase in the thermal discharge in August 1985, the level was similar to levels reached "in recent years and yet there has been no corresponding sharp decline in MRI's original trawl data for these years." Therefore, the permittee concludes that BPS thermal discharge in August 1985 "is **not** accountable" for the declines in the number of fish caught in the MRI trawl in the winter months of 1985–1986.

Response

While it is true that the waste heat rejection (as TBtu) on a yearly basis was much higher after 1986 than it was before that time and reached its peak in 1989, heat rejection steadily climbed from 1981 through 1985 (Figure 12). It declined slightly in 1986 but then continued to climb until 1989. The dramatic decrease in winter flounder populations, based on the MRI trawl data, over the years 1984 through 1988 and the continued flat-line at near zero levels after that time, concurs with the theory that the system reached a breaking point in the mid-1980s from which it has not recovered. Whether or not the system reached a breaking point prior to the time when BPS reached peak heat rejection is irrelevant. From 1984 through 2000, both intake flows and heat rejection were either at the same level or at higher levels than they had been in 1984.

Based on this information, it is likely that combined impacts from heat and entrainment and impingement were greater after 1984 than prior to that time. Fish populations (winter flounder, tautog, and windowpane) in MRI trawls all continued to decline through the years 1984 through 1987 and appeared to bottom-out in 1988, coinciding with the theory that the system reached a breaking point in the mid-1980s from which it has not recovered.

61. Comment

PG&E-NEG stated that there was "no coincidence" in time between the conversion of Unit 4 and the decline of the Mount Hope Bay fishery. The permittee went on to state, however, that there were **other** significant stresses on the fish and habitat of Mount Hope Bay at that time. Specifically, the permittee points to the following factors:

a. The dredging of 1000 bushels of quahogs from the Lee River in the summer of 1985.

b. Hurricane Gloria occurred in September 1985.

c. Dredging at the Taunton River intake of BPS in the area of MRI standard trawl sites during October to December 1985.

Response

EPA maintains that there is a clear correlation in time between fish abundance and both plant flow and heat rejection. Collie and Delong (2002), investigators that PG&E continually point to in an attempt to make their case, cite the strong correlation between winter flounder abundance and BPS cooling water flow as one reason they conclude that BPS is having an impact on winter flounder in Mount Hope Bay.

EPA does not agree that the other factors listed above would produce the extensive, long-term impacts observed in Mount Hope Bay. The one-time dredging of quahogs and of the BPS intake channel would be expected to result in a short-term, localized impacts on benthic communities. However, neither of these events would affect multiple species over a 5 to 9 square mile area for 18 years hence. Hurricane Gloria certainly would be sufficient to impact a widespread area, but again it is an event that is of limited duration. It is unlikely to have affected multiple species for 18 years subsequent to its passing. Hurricanes and dredging occur all over New England on a fairly regular basis without an associated loss of fish stocks in multiple species to the magnitude observed in Mount Hope Bay. It is not realistic to attribute such a dramatic collapse in multiple fish stocks and the subsequent flatlining of the populations on hurricanes or one-time dredging activities.

EPA believes, after careful consideration, that BPS's operations constitute the only stressor that could so significantly affect such a large area of Mount Hope Bay for such an extended duration. BPS takes in almost 1 billion gallons of cooling water a day (1/50th of the volume of the bay) and discharges water back to the bay up to 30 ^{o}F warmer than ambient. The net effect of the thermal discharge is to elevate, on average, the entire 14 square miles of Mount Hope Bay by 1.5 ^{o}F in the surface zone (i.e., down to the 6-foot depth). BPS runs continually 24 hours a day for essentially the whole year (some units do go down for scheduled maintenance and Unit 4 is only run during peak energy times). No other stressor exerts such a widespread and continuous influence on the Mount Hope Bay system at an equivalent magnitude.

Collie, J.S. and A.K. DeLong 2002. Examining the decline of Narragansett Bay winter flounder Final Report to RI DEM Division of Fish and Wildlife. 150 pp.

62. Comment
PG&E-NEG says that the MRI Wilcox trawl data collected since 1997 is the "only strictly comparable measure of fish abundance that exists for all three areas" (i.e., "upper" and "lower" Mount Hope Bay and Narragansett Bay). The permittee says that these data "definitively" show fish abundance to be the same for all the areas and that both Mark Gibson of the RI DEM and EPA ignore the Wilcox trawl data. The permittee complained that EPA, instead, relies on a modeling exercise by Gibson to conclude that BPS is taking 80 percent of Mount Hope Bay's winter flounder.

Response
The Wilcox trawl data survey provides additional information to consider, but it is very short in duration compared to the other surveys. Additionally, the power of that survey to detect a difference between various stations has not been determined. Limited sampling, in combination with high variability, might preclude one from detecting real differences between populations. The Wilcox trawl data survey is of limited utility due to its short duration, limited number of samples, and the fact that it has missed the collapse of the fish stocks in Mount Hope Bay. Neither PG&E-NEG's population dynamics consultant, Hillborn, nor its fisheries consultant, DeAlteris, used this survey in their analyses. Hillborn specifically discounted it in his October 3, 2002, submission to EPA by stating: "Because this data series is relatively short (1997-present), the Wilcox trawl data has not been used for estimating winter flounder abundance."

The analysis done to estimate the percent of the population taken by BPS was conducted by EPA to put an appropriate frame of reference on the entrainment and impingement losses from BPS. It was not intended to look at differences between waterbodies in fish abundance as is intended with the Wilcox trawl survey. Thus, the Wilcox trawl survey and EPA's population analysis are not directly comparable. EPA did not consider one analysis in lieu of another as PG&E-NEG suggests.

63. Comment
PG&E-NEG stated that another of its consultants reviewed the fish population issues and concluded that Mark Gibson of RI DEM underestimated the present winter flounder populations in Mount Hope Bay, and that BPS water withdrawals do "**not** account for a large loss in population." The permittee said that its consultant Raymond Hilborn constructed a new model using "simpler, more biologically reasonable

assumptions" than Mark Gibson did and that Hilborn's model shows Mount Hope Bay winter flounder populations significantly larger than what Mark Gibson calculated. The permittee stated that Hilborn estimates that there were between 292,000 and 394,000 adult winter flounder in Mount Hope Bay during 1986 to 1999 and that it is significant that these numbers "matched closely" with an estimate of 279,953 during 1989–90 that Gibson made in a 1993 analysis. The permittee further states that "using Region I's calculations" and his own population estimate, Hilborn shows that the permit limits proposed by PG&E-NEG would result in the entrainment and impingement of less than 5 percent of the Mount Hope Bay's winter flounder. The permittee argued that this is far less than an 80 percent take and much less than the 26 percent take that EPA has deemed acceptable. PG&E-NEG stated that Hilborn's estimates are the most reliable ones because they avoid Gibson's alleged errors of "confusing data for upper bay with entire bay," avoid making unnecessary assumptions, and are consistent with empirical data from the Wilcox trawl. The permittee also cited comments by another of its consultants, Kenneth Rose, to support its contention that Hilborn's estimates are most reliable.

Response

The discrepancy in winter flounder population estimates between EPA and Hillborn largely arise from differences in interpreting what areal extent each fish sampling program represents. In EPA's estimate of winter flounder abundance in Mount Hope Bay, it relied on the MRI trawl survey as a scaler of abundance for all of Mount Hope Bay. Hillborn's estimate relies on prior work done by PG&E-NEG consultant Joseph DeAlteris. DeAlteris commented that the MRI trawl survey represented only 5 square miles of Mount Hope Bay and that winter flounder abundance for the rest of the bay, about 9 square miles, should be represented by stations sampled by the RI DFW survey.

DeAlteris' depiction of what areal extent is represented by each trawl survey is artificial. He asserts that the MRI trawl survey represents fish abundance in only the Massachusetts portion of Mount Hope Bay. As seen in Figure 8, the MRI standard trawl survey has 1 station that is one mile south of the state border well into Rhode Island waters. Thus, for this and other reasons, DeAlteris' assertion that this trawl survey represents only 5 square miles is flawed. Based on the results of this survey and the RI DFW survey, EPA believes that the MRI survey presents a reasonable estimate of fish abundance.

Additionally, DeAlteris' assertion that the RI DFW trawl survey represents the lower 9 square miles of Mount Hope Bay is flawed. The RI DFW fixed-station survey is intended to look at long-term trend abundance over all of Rhode Island state waters. Due to its large geographic scope, the number of sampling stations and frequency of sampling is limited for any specific waterbody in the survey. In Mount Hope Bay, there are only two stations, a shallow water (< 20 feet depth) station near Spar Island and a deep water (> 55 feet depth) station near the connection between Narragansett Bay and Mount Hope Bay. Mount Hope Bay is predominantly a shallow water system. Using published depth contours for Mount Hope Bay, EPA estimates that 88 percent of surface area of the bay is less than 30 feet deep. EPA also estimates that only approximately 3 percent of Mount Hope Bay is greater in depth than 45 feet. DeAlteris treats the two RI DFW stations mathematically equal and as a result greatly overstates the relative importance of their deep water station. By default, this station contributes 50 percent of the data to the analysis though it is representative of, at best, 3 percent of the depth contours of the bay. This station, possibly due to its depth, location, and cooler water temperatures, consistently produces many more fish than the shallow water station near Spar Island. Both the MRI and RI DFW trawl surveys show a distinct depth preference by winter flounder in Mount Hope Bay. The MRI survey shows that for their time series approximately 80 percent of the winter flounder they catch are found in deep water (> 20 feet). The RI DFW survey shows similar results with 88 percent of their winter flounder caught in their deepwater station. Thus, the artificially increased importance of the deepwater station tends to inflate the winter flounder abundance numbers in what DeAlteris calls lower Mount Hope Bay. This results in an artificially minimized difference between lower Mount Hope Bay and Narragansett Bay.

Hillborn derives a population estimate based on three different approaches. One is based on the work done by DeAlteris and his parceling Mount Hope Bay into segments. The flaws of that work are discussed in the previous paragraph. Hillborn's second approach uses impingement rates as an index of abundance. It has long been the position of EPA and the majority of the Brayton Point TAC that impingement rates provide a good qualitative measure of relative fish abundance, but it is not a quantitative technique. Impingement is measured at the intake screens, thus this analysis is based solely on one sample. If fish were equally distributed throughout Mount Hope Bay, one might be able to make a case that a single sampling location would suffice. However, EPA knows from the MRI trawl survey that fish are not equally distributed. As stated previously, MRI takes about 80 percent of the winter flounder that they catch in one station, which is the trawl station in the deeper water in front of the intake structure. Due to their proximity to the intake structure, fish in this area have a much higher probability of being impinged than fish in other portions of the bay. This makes extrapolating impingement rates to a baywide population estimate dubious at best. The effect of the greater concentration of flounder immediately in front of the intake will result in higher impingement rates that, when extrapolated on a baywide basis, will significantly artificially inflate the population estimate of winter flounder. Finally, Hillborn's third approach is to use an estimate derived by Mark Gibson for Narragansett Bay winter flounder concentrations and apply those concentration values to the area of Mount Hope Bay. Hillborn's justification for assuming equal fish densities in Mount Hope Bay and Narragansett Bay is the comparability of catches in the Wilcox trawl series. However, EPA questions the validity of this assumption based on the relatively short duration of the survey and limited number of stations involved. In his October 3, 2003, comment letter to EPA, Hillborn discounts using the Wilcox trawl results due to the limited duration of the survey, but later cites it as the sole evidence that the assumption of equal fish density in both Mount Hope Bay and Narragansett Bay. Data from RI DFW stations in both Mount Hope Bay and Narragansett Bay suggest that there is a clear difference in winter flounder density from shallow water stations in Mount Hope Bay compared to shallow water stations in Narragansett Bay. Shallow water stations in Mount Hope Bay have much lower densities of winter flounder, thus Hillborn's assumption of equal densities will result in an overestimate of fish population numbers in Mount Hope Bay.

PG&E-NEG pointed to comments solicited from Ken Rose for support of Hillborn's analysis. Rose provides comments on Gibson's Fishery Production Foregone model and Hillborn's alternate Production Foregone Analysis. Neither of these speak directly to the question of what the winter flounder population is in Mount Hope Bay and so Rose's comments do not directly support the larger Hillborn assertion of a population of 300,000 winter flounder in Mount Hope Bay. Rose points out that the primary difference between Gibson's Fishery Production Foregone model and Hillborn's Production Foregone Analysis is the difference in interpreting what area the MRI trawl survey really represents. Hillborn relies on the DeAlteris assertion that this represents one-third of the Bay, while Gibson assumes it represents the entire bay.

64. Comment

PG&E-NEG stated that the population of young winter flounder in Mount Hope Bay is not less than the population in Narragansett Bay. According to the permittee, Region 1 relies in part on a length frequency distribution analysis for two species, argues that it indicates a population decline in Mount Hope Bay driven by a loss of young fish rather than older fish, and then argues that this is more indicative of a plant discharge/intake effect than of overfishing. The permittee argued that EPA's analysis had "analytical shortcomings and data misrepresentations which invalidate its conclusion," and that EPA's analysis was "incomplete, biased and unreliable." According to the permittee, specific problems with the analysis include the following:

a. Instead of examining all the data, EPA "selectively analyzed only one of four data sets" available for Mount Hope Bay" and chose the poorest one for reflecting young and small fish.

b. Instead of using all the data from the one set that was analyzed, EPA looked only at 3 years of data from the 30 years of data that exist, whereas examination of all 30 years shows no difference and the only years that do show a difference are the 3 years that EPA used.

c. EPA compared data collected with a fine mesh trawl in Narragansett Bay to data collected with "coarse mesh" trawl in "upper Mount Hope Bay," which is "inappropriate" due to the different selectivity of the different nets.

d. Examination of the length frequency data from "other" years along with "other data sets (including the impingement data) shows that the decline of winter flounder in Mount Hope Bay is in the larger fish, which suggests a fishing effect, rather than a BPS effect.

Response

EPA disagrees with the comment. The Agency considered all the data. The permittee stated that EPA selected data from only one survey of the four surveys available. EPA assumes that the four surveys that they are referring to are the MRI standard trawl survey, the MRI Wilcox trawl survey, the RI DEM trawl survey, and impingement data. EPA chose data from the MRI survey, because it is the most comprehensive survey in Mount Hope Bay and it spans the time period before and after the collapse in 1984. The Wilcox trawl survey has only recently been instituted and thus, has no value in assessing pre-collapse size distribution. Using impingement data is inappropriate, because smaller fish have a greater probability for impingement than larger fish, due to their correspondingly reduced swimming ability. Thus, impingement data are biased towards smaller size classes of fish. The RI DEM survey is not as robust as the MRI survey, so it was not used. EPA reviewed the MRI data and graphically presented a subset of that data set merely to illustrate its point.

The shift in size distribution within Mount Hope Bay cannot be explained by differences in mesh size as the mesh size used by MRI was consistent throughout the study. The comparison to Narragansett Bay did require using data from a survey with different mesh size. This was done simply to illustrate that Narragansett Bay (after the collapse in Mount Hope Bay) had a winter flounder population with a larger size range distribution. EPA believes this is a valid qualitative comparison.

65. Comment

PG&E-NEG stated that no scientist other than Mark Gibson of the RI DEM has found any evidence that winter flounder are recovering in Narragansett Bay but not in Mount Hope Bay. The permittee commented that it had one of its consultants investigate this issue and he concluded that data from 1995–1996 showed a brief, modest increase in winter flounder in Narragansett Bay and that the data since that time have shown a decline to record low levels. According to the permittee, the Wilcox trawl data show no difference in winter flounder density between Mount Hope Bay and Narragansett Bay since 1997 (when the Wilcox trawl began). The permittee also asserted that EPA's reference to the recovery of fish stocks on George's Bank is irrelevant because it is a different stock, and the appropriate comparison is to the Narragansett Bay stock. In addition, the permittee stated that a study by Collie and Delong (July 2002) concludes that winter flounder in Narragansett Bay are not recovering, and that another researcher (Jeffries) recently reported that, consistent with conditions in Mount Hope Bay, winter flounder in Narragansett Bay have declined by 96 percent in the last 20 years and are not recovering.

Response

The permittee attempted to depict winter flounder stocks as declining regionally by providing some specific examples of local populations that have declined. EPA disagrees with PG&E-NEG's

characterization of a regional decline in winter flounder. In other responses in this document, EPA presents data from the most recent Southern New England regional stock assessment for winter flounder, of which Rhode Island is a part. This stock shows a modest recovery in recent years, one that is not reflected in Mount Hope Bay.

Winter flounder in Narragansett Bay are at low levels, but RI DEM data continue to show that they persist at a higher abundance than in Mount Hope Bay. Finally, the difference in long term abundance trends remains statistically different between Mount Hope Bay and Narragansett Bay.

66. Comment
PG&E-NEG stated that EPA apparently "did not read" either the Collie or Jeffries papers since they were not in EPA's Administrative Record.

Response
EPA did read the year one interim report from Collie and Delong before issuing its Draft Permit. This is listed in the Literature Cited section of the § 316 (a) and (b) Permit Determinations Document. The final version of this paper, with conclusions not substantively different than the interim report, came out after EPA had issued the Draft Permit. EPA has read the Final Report and included it in the content of its responses and its Administrative Record. EPA also reviewed the Jeffries paper that the commenter makes reference to and that is cited in a number of our responses. EPA believes that both papers make numerous points that support the Agency's final conclusions. Those specific points are discussed in other responses.

67. Comment
PG&E-NEG argued that EPA fails to follow the Agency's own "Stressor Identification Guidance Document" which was "issued in 2000 to address effects on fish populations." The permittee further stated that this Guidance makes clear that statistically significant correlations between variables do not prove causation and that it is "'wrong' to conclude that 'statistically significantly correlated variables have a causal relationship.'" The permittee also stated that it is "completely inappropriate to do so on the basis of a single observed correlation, especially where no comprehensive attempt has been made to rule out other possible causal factors." According to the permittee, EPA nevertheless relied on an incorrect analysis of Mark Gibson of the RI DEM that "clashes with principles of sound scientific inquiry."

Response
As EPA has stated in previous responses, it has not claimed that the data collected to date establish a causal relationship, in the strictest scientific terms, between plant operation and fish abundance in Mount Hope Bay. EPA did consider alternate explanations (fishing, global warming, dissolved oxygen, predation) for the collapse of fish stocks in Mount Hope Bay. However, none of these alternate explanations could reasonably explain the timing, magnitude in extent of decline and area affected, number of affected species, and duration of the effect of the finfish collapse in Mount Hope Bay. EPA presented evidence, which included field data, observational data, and modeling to support the position that BPS is currently having a substantial impact on the Mount Hope Bay ecosystem. Our analysis is not inconsistent with EPA's guidance document.

Response #: VII.68	**Document #**: 1133

Comment
EPA received one comment stating that the 1976 NPDES permit was issued against the advice of all State and Federal biologists involved with the permit at the time.

Response
A memo written by Russ Isaac of MA DEP reports that at a June 30, 1976, public hearing, Jan Praeger of EPA, Juan Gonzales, and Clarence Tarzwell were all opposed to the issuance of the permit with an increased thermal discharge limit. Prager went so far as to say that he would prefer to see violations of standards at better-sited plants, such as Pilgrim, than the proposed increase in thermal discharge at BPS.

Response #: VII.69	**Document #**: 1159

Comment
One commenter supports the use of the 0.333-mm mesh icthyoplankton net in sampling fish eggs and larvae.

Response
The 0.333-mm mesh net will continue to be used for sampling of fish eggs and larvae.

Response #: VII.70	**Document #**: 1180

Comment
EPA received one comment stating that winter flounder populations in some areas, such as Georges Bank, are thriving despite heavy fishing pressure.

Response
The most recent Stock Assessment Review Committee reports on winter flounder show that spawning stock biomass for winter flounder populations in the Gulf of Maine and Georges Bank are well above the maximum sustainable yield (Figures 4 and 5). Although these populations sustain heavy fishing pressure, they appear to be fairly resilient. The southern New England winter flounder stock is still well below the spawning stock biomass that would result in the maximum sustainable yield to the fishery (Figure 6). As a result, fishing mortality has been reduced and will be reduced further to allow a rebuilding of the stock. Spawning stock biomass for this population bottomed out in the mid-1990s, but has shown a slight recovery (Figure 6).

Response #: VII.71	**Document #**: 1056

Comment
EPA received one comment stating that Mount Hope Bay and the biological community should be monitored even after cooling towers are installed.

Response
EPA's permit continues the ambient monitoring program so that future changes in the biological community will be tracked.

Response # : VII.72	**Document #**: 1220

Comment
EPA received one comment stating that runoff from the coal pile is negatively affecting winter flounder spawning grounds.

Response
Winter flounder are believed to spawn in brackish waters, so the lower portion of the rivers that feed into Mount Hope Bay are the most likely areas for spawning activity. These areas are in the northern part of the bay and in relatively close proximity to the station. BPS does spray water over the coal pile to

minimize loss of coal dust to the wind. Undoubtedly, some quantity of coal is lost to the bay during transfer from coal-delivering vessels and storage. Unfortunately, the quantity of material lost and the significance of its effect are currently unknown.

Response # : VII.73	**Document #**: 1034

Comment
EPA received one comment stating that fish in North Watuppa Pond have the highest levels of mercury of any other pond in the State. The commenter suggests that the high levels of mercury are due to air emissions from the Brayton Point and Montaup power plants.

Response
This permit addresses only the water-related discharges from BPS into Mount Hope Bay. Air emissions are currently being addressed by a separate MA DEP and EPA effort.

Response # : VII.74	**Document #**:1026

Comment
EPA received one comment stating that discharging the waste heat to the bay or releasing it to the atmosphere is a waste of a resource that could be reused.

Response
There is no question that waste heat has been put to multiple good uses in other locations. In fact, an LNG storage facility proposed for Brayton Point has suggested it would use some of the waste heat from BPS to warm and vaporize the LNG.

D. Air Quality

Response #: **VII.75**	**Document #**: 1004, 1007, 1021, 1028, 1032, 1035, 1036, 1042, 1052, 1062, 1063, 1067, 1071, 1072, 1078, 1079, 1080, 1081, 1084, 1085, 1088, 1091, 1092, 1118, 1137, 1138, 1169, 1198, 1201, 1209, 1212, 1213, 1217, 1220, 1222, 1229,1237,1242, 1243

Comment
EPA received approximately 38 comments regarding air pollution from BPS.

Many commenters pointed out that BPS is a significant source of air pollution and expressed concern over breathing polluted air. Some commenters offered personal observations of “soot stained homes and cars” (1032), or the “brown/orange haze that covers the northern part of Mount Hope Bay.” (1062) Another commenter stated that “looking up at the sky, I could see a thick yellowish plume under the black clouds and realized it was from Brayton Point.” (1137)

Some commenters requested that EPA “include the air quality issue of Brayton Point” (1080) and “urge[d] the EPA to address the negative effects of the BPS on the air quality” (1081) as part of the NPDES permit action.

One commenter noted that PG&E is expending “a quarter of a billion dollars on environmental improvements for both air quality improvements and reductions in thermal discharge.” (1169)

One commenter stated, “The air quality in this community is exceptionally good.” (1237)

Response

The new NPDES permit for BPS is being issued under federal and state water pollution control laws. This permit does not and cannot regulate air pollutant emissions. Nevertheless, EPA agrees that air pollution from BPS is of concern. Air pollution concerns are addressed on the Federal level through the Clean Air Act (CAA) and, on the State level through Massachusetts Air Pollution Control regulations (310 CMR 7.00).

BPS is currently updating its air pollution control equipment pursuant to MA DEP air regulations. This upgrade will result in significant reductions of air pollution from the facility. The controls, scheduled to be in place by 2006, are predicted to result in annual reductions of approximately 18,500 tons of sulfur dioxide, 7,600 tons of nitric oxides, and 4,000 tons of carbon monoxide. See June 2003 report by the permittee's consultant, TRC, Inc.

EPA's proposed NPDES permit may require that the facility install mechanical draft cooling towers which could result in additional particulate emissions from the facility.

The issues of air pollutant emissions that could result from operating cooling towers at BPS will be subject to further review in the development of MA DEP and EPA air permits. There is currently insufficient information to precisely evaluate the potential air quality impacts and any mitigation measures associated with cooling tower operation at BPS that may be necessary. BPS will be required to submit additional information pertaining to air quality impacts and mitigation measures before it receives the necessary approvals to construct and operate cooling towers with an air pollution emission rate exceeding 1 ton annually, which would include particulates such as salt.

As part of its air quality review, MA DEP will determine whether the BPS cooling technology meets the BACT standard. The BACT evaluation includes a comparison of available air pollution control technologies with respect to their efficiency, reliability, feasibility, and cost. BACT review will likely consider wet and dry cooling, salt- and freshwater cooling, alternative cooling towers, and, mist and drift elimination options. It is important to note that the company itself, in its November 2001 316(a) and 316(b) Demonstration Document, stated that "[t]he usual drift dispersion pattern results in salt deposition and saline air concentrations that represent only a slight increase over ambient coastal conditions." See Volume IV, p. 3-3. The company also submitted comments regarding particulate emissions from cooling towers, and in these comments it stated that "[b]ecause emitted water droplets potentially result in particulate emissions, in this case, mostly salt, cooling tower drift (or water droplets) would need to be controlled from the cooling tower to a level consistent with BACT. The most stringent level of control currently demonstrated in practice is the use of very high efficiency drift eliminators (0.0005 percent of the circulating water volume emitted as drift). This control would reduce drift to approximately 1.3 gallons per minute (gpm) in the case of the Enhanced Multi-Mode, whereas the 72-cell configuration would result in about 7.8 gpm of drift." See October 3, 2002 report by the permittee's consultant, TRC, Inc., p. 4.

BPS will also be required to apply to EPA for a permit in accordance with the PSD program if the selected cooling technology's emissions exceed certain thresholds. Massachusetts recently remanded this program to EPA. BPS will need to coordinate this permit review process with both EPA and MA DEP.

Regarding the comment that air quality is exceptionally good in Fall River, EPA offers the following response. EPA and MA DEP provide and maintain an ambient air quality network that provides a broad picture of air quality over a large area to characterize the State's overall compliance with Federal health-based air quality standards. Massachusetts meets all the current standards, except ozone, which is a New England regional problem. Fall River is contained in what EPA and MA DEP refer to as the eastern Massachusetts serious ozone nonattainment area. This designation means that the area is currently in nonattainment of the Federal air quality standard for ozone. In New England, the States operate a network of approximately 55 ozone monitoring stations during the ozone season (April 1 to September 30). Large industrial sources of air pollution such as power plants (e.g., BPS) are known contributors to ozone pollution, as are other sources such as motor vehicles. More information on air quality in eastern Massachusetts can be obtained from EPA's Air Quality Unit at (617) 918-1983 or by visiting EPA Region 1's Web site at http://www.epa.gov/region01/topics/air.

Commenters may obtain more information on air pollution requirements and regulations applicable to BPS by contacting EPA's Air Permits section at (617) 918-1650 or by contacting the MA DEP Air Division at (508) 946-2776.

E. Coal

Response #: **VII.76**	**Document #**: 1062, 1173, 1174, 1195, 1198, 1210, 1215, 1228, 1229, 1237

Comment
EPA received approximately nine comments regarding the use of coal as the fuel at BPS.

Many of these comments expressed concern that EPA's action could result in the shutting down of BPS, thereby reducing the percentage of electricity generated by burning coal. Commenters argued that this could reduce fuel diversity and cause the New England market to become overly dependent on natural gas for fuel. Commenter 1215 stated, "Another matter the EPA should consider is that, by 2005, the energy mix in New England could include 60 percent gas. If Brayton Point is not a player, would that number be 75 percent or even higher?" Commenters urged EPA to consider "…that any solution that is reached regarding Brayton Point must recognize the consequences to the diversity of the region's fuel mix and the economy." (1174)

Some commenters expressed concern over the air pollution that is generated by burning coal.

Response
EPA acknowledges the concerns expressed regarding fuel diversity. However, this permit addresses only the water pollution aspects of BPS's operation. The permit does not affect the type of fuel that the facility burns in any way. EPA's policy is to maintain a "fuel neutral" position when implementing its mandated environmental regulatory programs under the CWA.

Furthermore, EPA does not believe that this permit will result in the closure of the facility. Indeed, PG&E-NEG has not suggested that it would. Therefore, this permit should not affect the fuel mix in New England.

Concerns regarding air pollution from BPS are discussed elsewhere in this response-to-comments document.

F. Water Quality

Response #: **VII.77**	**Document #**: 1029, 1033, 1088, 1140, 1141, 1145, 1204, 1220

Comment
EPA received numerous comments relating to the chemicals used at BPS, their subsequent discharge to Mount Hope Bay, and the potential by-products formed. These commenters urged EPA to ". . . take a closer look at any chemicals that are being used and what effect they have on the waters of Mount Hope Bay." (1088)

Many commenters opposed the use of biocides at the facility. Commenter 1145 submitted a petition signed by approximately 650 individuals that stated, in part, "We object **strongly** to the use of **any biocide** at the plant. We want alternative technologies used instead." The petition also stated that "[w]e ask that all discharges—chemicals and/or metals be **filtered or neutralized at their point of least dilution.**"

One commenter (1204) expressed concern that chemicals were leaching from a fly ash pit along the shore of the Sakonnet River into the bay, stating, "…walk along the shore of the Sakonnet and see the fly ash pit that leaches out into the bay."

Two commenters were concerned with potential sediment contamination due to the discharge of chemicals from the facility, stating, "…these toxins settle in the mud of the sea floor, they mutate and they extinguish marine life." (1220)

Response

BPS has used, and plans to use, a variety of chemicals throughout the facility for a range of applications. The company is required to list all the chemical compounds it intends to discharge into the receiving water (Mount Hope Bay). EPA is required to limit any pollutant or pollutant parameter (conventional, nonconventional, toxic, and whole effluent toxicity) that is or may be discharged at a level that causes or has "reasonable potential" to cause or contribute to an excursion above any water quality criterion. For the Draft Permit, EPA evaluated the proposed chemicals to be discharged from BPS for "reasonable potential" to cause or contribute to an excursion of water quality criterion and, where appropriate, developed Draft Permit limits for such chemicals. EPA also applied the technology-based limits for the Steam Electric Power Generating Point Source Category (found at 40 CFR Part 423) to BPS's Draft Permit.

Based on commenter 1088's request, EPA has reevaluated the intended use of chemicals at BPS and the subsequent discharge of these chemicals to Mount Hope Bay. After consultation with the MA DEP, EPA has added an additional monitoring and reporting requirement for vanadium at outfall 004A. This was added in order to monitor Brayton Point Station's current discharge of wastewater for the presence of vanadium. EPA has concluded that the limits contained in the Permit, including the WET testing requirement, are sufficiently stringent to ensure compliance with the Massachusetts water quality standards and satisfy the technology requirements at 40 CFR Part 423.

EPA offers the following response to the comment opposing the use of biocides at the plant. (1145) The facility will use sodium hypochlorite to control biological growth throughout plant systems, including the condenser tubes and the service water system. Sodium hypochlorite is a biocide commonly used throughout the power generating industry. BPS employs a "targeted" chlorination cycle designed to minimize the use, and therefore the discharge, of chlorine. Additionally, the facility demonstrated its use of another method of biofouling control in the condenser tubes, namely, the SIDTEC system. This system uses mechanical means to remove any built-up fouling material from the condenser tubes (so-called "rockets" that are buoyant and are distributed through the condenser tubes with the cooling water). This system will further reduce BPS's chlorine use. EPA has established water quality-based limits for chlorine at outfall 001 and technology-based chlorine limits for the future cooling tower blowdown at internal outfall 003. EPA believes mthese limits are consistent with state and federal requirements and will therefore allow the use of sodium hypochlorite as outlined in the Draft Permit.

BPS has also requested the use of an additional biocide, namely, Spectrus CT1300, for use in the service water system. The service water system is separate from the cooling water system. EPA determined that an acceptable Draft Permit limit for this chemical is 0.2 ppm. This limit was derived using the chemical's toxicity effect on Mysid shrimp and the dilution of the receiving water, as well as the expected concentration to be used at the facility. In addition to putting a numerical limit in the permit, EPA is also requiring the facility to conduct quarterly WET testing when Spectrus CT1300 is in use. This testing requirement will allow EPA to monitor and verify that the discharge from BPS, including the Spectrus CT1300 chemical, is not toxic to aquatic life. In response to comments, EPA obtained additional information on Spectrus CT1300 with regard to its half-life and environmental fate. This information indicates that Spectrus CT1300 is relatively short-lived in the environment and will have a significant reduction in concentration (by one-half) within about 5 hours (see Administrative No. 3213). Therefore, EPA will allow the use of Spectrus CT1300 as outlined in the Draft Permit.

As previously discussed in the response to air pollution concerns, this permit addresses the intake and discharge of cooling water and wastewater from BPS in accordance with the CWA. EPA is not aware of any chemicals leaching from fly ash pits along the Sakonnet River. If any such releases have been observed, however, they should be reported to EPA's Office of Site Remediation and Restoration at (617) 918-1200 or the Southeast Regional Office of MA DEP at (508) 946-2700.

The issue of sediment contamination is addressed elsewhere in this response-to-comment document.

G. Other

Response #: **VII.78**	**Document #**: 1218

Comment
In the cover letter transmitting its comments on the permit, PG&E-NEG complained of inadequacies in EPA's Administrative Record for the NPDES permit. First, the permittee claimed that it "highlighted" gaps in the record in an August 21, 2002, letter it sent to EPA. It stated that a number of documents were "missing" from the record and that it would shortly provide a list of these missing documents. The permittee also stated that it "reserves its right to submit additional comments relating to" information recently made available by the MA DEP or any information later made available by EPA and/or the MA DEP.

Response
In a letter dated August 21, 2002 (AR 3068), the permittee alleged inadequacies in the Administrative Record. In comments on the permit, the permittee cited this letter, seeming to retain the views it had previously presented. EPA's view, however, is that its Administrative Record supporting the Draft Permit satisfied applicable legal requirements. EPA has responded to the allegations in the permittee's August 21, 2002, letter in two memoranda and a letter to the permittee, all of which are included in the Administrative Record and incorporated herein by reference (AR 3024, 3025, 3060).

In its August 21, 2002, letter, the permittee also requested that the public comment period for the Draft Permit be extended from September 4, 2002, to November 15, 2002. This would have resulted in a total comment period of nearly 4 months (the Draft Permit was issued on July 22, 2002). EPA regulations require comment periods for NPDES permits to last a minimum of 30 days. See 40 CFR § 124.10(b). Nevertheless, EPA initially went beyond the minimum requirement and set a 45-day comment period (to end on September 4, 2002). In response to the permittee's request, and despite disagreeing with the permittee's complaints, EPA extended the comment period by an additional 30 days (i.e., until October 4, 2002). See AR 3023, 1162, 1163, 3024, and 3025. This extension stretched the comment period to 2.5 months (or 75 days), well beyond the minimum requirement of 30 days. EPA believes this comment period was reasonable.

As stated above, EPA responded to the allegations in the permittee's August 21, 2002, letter in two memoranda and a letter to the permittee included in the Administrative Record and incorporated herein by reference (AR 3024, 3025, 3060). A few additional points should be made here, however. First, the permittee stated in its August 21, 2002, letter that it would provide a list of documents that should be included in EPA's Administrative Record but that were missing from it. As of the date of issuance of this Final Permit, the permittee still has provided no such list. Second, in a December 2, 2002, letter, the permittee reiterated and augmented many of its complaints about the Administrative Record and again called for the comment period to be reopened. In addition, the permittee called for the permit proceedings to be "stayed" in light of EPA headquarters' work toward issuance of new, final regulations applying CWA § 316(b) to existing large power plants such as BPS. Again, EPA disagrees with the permittee's complaints about the Administrative Record and has rejected the requests that the comment period be reopened or that the permit proceedings be stayed. EPA believes its approach on these issues was reasonable and appropriate. The Agency notes that the permittee's December 2, 2002, letter was submitted nearly 2 months **after** the close of the comment period (despite the fact that, as the permittee was fully aware, the proposed regulations referred to in the letter were formally presented for public comment in April 2002 and have been under development for much longer than that). Nevertheless, EPA considered the permittee's letter, and the Agency's responses to it are set forth in a letter (AR 3021) and a memorandum to the file (AR 3022), both of which are in the Administrative Record and incorporated herein by reference.

Response #'s: VII.79	**Document #'s:** 1000

Comment
One commenter stated that the bottom sediments of Mount Hope Bay should be tested for contamination, and that quahogs, an important regional resource, should be tested for arsenic and other heavy metals.

Response
Quahogs have been routinely tested for heavy metal contamination, including arsenic. In general, heavy metal concentrations in quahog tissue have been relatively low. Testing of the sediments themselves has not been required, although proposed dredging associated with the siting of proposed LNG storage facilities would likely result in chemical testing of sediments throughout Mount Hope Bay.

Response #'s: VII.80	**Document #'s**: 1002

Comment
One commenter indicated that "the ecological system has improved a lot," referring to the fact that he has seen more cormorants and harbor seals recently. The commenter did not believe that the station kills as many fish as are taken by anglers and asked for more fishing restrictions.

Response
Trends in cormorant populations are discussed in the July 22,2002, Permit Determinations Document, and EPA acknowledges that their populations have increased substantially since the 1980s. However, the observation of more cormorants and harbor seals does not necessarily equate with a healthy ecosystem or with balanced, thriving fish stocks. Boston Harbor, even at its worst point, had an abundance of both cormorants and harbor seals. Severe fishing restrictions are currently in place, although additional regional controls are needed. Fishermen will soon be required to make significant additional sacrifices when Amendment 13 of the Northeast Multispecies Fishery Management Plan is enacted (this is expected to happen by next spring). Amendment 13 is intended to significantly reduce fishing mortality on a number of groundfish species, including winter flounder.

Response #'s: VII.81	**Document #'s**: 1006, 1011, 1182

Comment
Several commenters, some referring to the transcripts of the CBS News broadcasts on August 28 and 29, 2002, expressed concern that increased air emissions might contribute to the effect of global warming and that the proposed permit "may cause more problems than what already exists." (1006) These commenters also suggested that "glacial warming and El Niño have resulted in changes in the ocean water temperatures, and these changes are a hundred times more detrimental to the fish population in Mount Hope Bay than the effect of the Brayton Point Power Plant." (1011)

Response
Several researchers (Oviatt 1994, MRI 2002) have independently established that water temperatures within Narragansett Bay and Mount Hope Bay have been increasing over the last 30 to 40 years. This trend has not been conclusively attributed to human-induced global warming or some natural long-term climatic variation. EPA believes that the effects of global warming on Mount Hope Bay are much less significant than the effects of the thermal discharge from BPS. EPA has calculated that long-term temperature rise contributes an additional 0.0383 TBtu/year in heat, whereas BPS's current permitted discharge contributes up to 42 TBtu/year. To the extent that global warming is raising water temperatures, it makes BPS's thermal discharges all the more problematic.

Response #'s: VII.82	**Document #'s**: 1011

Comment
One commenter believed that the fishing vessels that use dragging nets might be a significant cause of the low abundance of fish in the bay and suggested that more restrictions on this type of fishing could be helpful.

Response
It has been established that fishing gear dragged on the ocean floor can have significant impacts on benthic habitats. This is particularly a problem in deepwater habitats, where natural levels of disturbance are low, or in habitats that have high levels of structural complexity, such as corals, sponges, or seagrasses. Fishing gear tends to fragment and, in extreme cases, eliminate these habitats, which can require extended recovery times. In Mount Hope Bay, commercial harvesting by trawlers has been eliminated. A limited amount of trawling is being done by MRI and the State of Rhode Island for monitoring purposes. In addition, Mount Hope Bay is shallow with a structurally simple muddy/silty bottom. The benthic community associated with this type of bottom type tends to be fairly resilient to disturbance from storms or trawling. The limited amount of trawling combined with the natural resilience of the benthic habitat in Mount Hope Bays makes habitat destruction from fishing gear a very minor problem.

Response #'s: VII.83	**Document #'s**: 1016

Comment
One commenter suggested that horticultural or floricultural processes could reuse the heat generated from the plant and that the Department of Agriculture should be consulted in this regard.

Response
EPA recognizes that this is a promising idea but currently has no knowledge of any similar applications.

Response #'s: VII.84	**Document #'s**: 1034, 1189

Comment
Commenters indicated that the Draft Permit "advances environmental justice for the residents of Fall River and surrounding communities" and describes the unusual number of pollution sources in the area. In addition, the commenter stated that "the bay is not PG&E-NEG's private pond to debase and destroy. It is all of ours."

Response
These comments have been considered. EPA agrees that Mount Hope Bay is an important public resource.

Response #'s: VII.85	**Document #'s**: 1043, 1105, 1111, 1124

Comment
Commenters offered editorials regarding PG&E-NEG's likely arguments against the permit and the commenters' support for the Draft Permit.

Response
These comments have been noted. EPA has responded to specific points raised both against and in support of its permit elsewhere in this document.

Response #'s: VII.86	**Document #'s**: 1053

Comment
The commenter asked EPA to provide assistance to the City of Fall River regarding its effort to eliminate the CSO discharges.

Response
The City of Fall River currently has a Consent Decree with the Conservation Law Foundation (CLF) addressing its CSO discharges. EPA has worked with the City regarding other water pollution control issues.

Response #'s: VII.87	**Document #'s**: 1054

Comment
A commenter was concerned that the mercury and other hazardous materials in the water make the fish unsafe for human consumption.

Response
While EPA acknowledges the commenter's concern, this issue is outside the scope of this permit. This permit addresses BPS's water discharges. BPS does not discharge mercury in its liquid waste stream. The issue of mercury emissions from Brayton Point's stacks is being addressed by EPA's Air Program.

Based on a mandate given to EPA by Congress in section (112)(n)(1)(A) of the Clean Air Act, as amended, the EPA performed a study of the hazards to the public health reasonably anticipated to occur as a result of hazardous air pollutants (HAP) emissions by electric utility steam generating units (power plants). The results of the study where released in a Report to Congress on February 24, 1998. In the study, EPA identified mercury as the hazardous air pollutant of potential greatest concern from coal-fired utilities.

EPA was also required to determine whether, based on the results of the study and any other applicable information, regulation of HAP emissions from the industry was appropriate and necessary. On December 20, 2000 (65 FR 79825), EPA announced that it will regulate emissions of mercury and other air toxics from coal- and oil-fired power plants. Proposal of emission standards will be on or before December 15, 2003, with promulgation following on or before December 15, 2004.

Response #'s: VII.88	**Document #'s**: 1055, 1072

Comment
One commenter, who lives near the plant, strongly supported EPA's efforts and believed that the plant cares only about profits and would manipulate findings so that it does not have to pay for environmental controls.

Response
In developing this permit, EPA has carefully and objectively evaluated information submitted by the permittee as well as all other parties.

Response #'s: VII.89	**Document #'s**: 1056, 1138

Comment
Commenters supported the Draft Permit and encouraged the immediate enforcement of the corrective actions as well as continued environmental monitoring to determine the bay's recovery progress.

Response
These comments have been noted. As discussed elsewhere in this document, the Draft Permit contains monitoring provisions that will provide consistent documentation of the environmental conditions in the bay.

Response #'s: VII.90	**Document #'s**: 1079

Comment
One commenter speculated that her husband's recent respiratory health issues are related to the air emissions from BPS, noting that they moved downwind of the plant 3 years ago.

Response
Although the Agency cannot speak to the cause of the respiratory issues mentioned by the commenter, EPA agrees that air pollution from BPS is of concern. However, this permit addresses only discharges to water under the CWA. Air pollution concerns are addressed on the Federal level through the CAA and on the State level through Massachusetts Air Pollution Control regulations (310 CMR 7.00).

BPS is currently updating its air pollution control equipment pursuant to MA DEP air regulations. This upgrade will significantly reduce air pollution from the facility. The controls, scheduled to be in place by 2006, will result in annual reductions of approximately 18,500 tons of sulfur dioxide, 7,600 tons of nitric oxides, and 4,000 tons of carbon monoxide. See June 2003 report by permittee's consultant, TRC, Inc.

Response #'s: VII.91	**Document #'s**: 1034, 1036, 1094 1119, 1129

Comment
The commenters offered editorials supporting the permit.

Response
These comments have been considered.

Response #'s: VII.92	**Document #'s**: 1096

Comment
One commenter asked to know "what the elevated temperatures may be doing to other marine life and our environment?"

Response
EPA refers the reader to Chapter 6 of the July 22, 2002, Permit Determinations Document for a discussion of thermal impacts on marine life.

Response #'s: VII.93	**Document #'s**: 1101, 1102, 1105, 1111, 1112, 1124, 1144, 1212

Comment
Several commenters supported the requirement of closed-cycle cooling and regular, long-term monitoring, including of shellfish and sediments, and they indicated that improvements should be implemented as soon as possible regardless of intense pressure to make the permit less stringent.

Response
These comments have been noted. EPA has discussed monitoring requirements and the issues surrounding closed-cycle cooling elsewhere in this document.

Response #'s: VII.94	**Document #'s**: 1116

Comment
One commenter endorsed EPA's effort to reduce thermal loading to the bay and also asked that "hazardous waste dumping by BPS be brought to an end as well."

Response
This comment has been noted. This permit addresses water pollution issue only.

Response #'s: VII.95	**Document #'s**: 1118

Comment
One commenter, who supports EPA's efforts, described the decline of quahogs in the Kickamuit River and asked that the station be closed.

Response
EPA is not aware of any quantitative data on quahog densities in the Kickamuit River that document a decline. In addition, EPA has never advocated closing BPS. EPA believes that BPS's cooling technology can be upgraded, and that the changes in technology stemming from this permit will result in significant benefit to the Mount Hope Bay ecosystem.

Response #'s: VII.96	**Document #'s**: 1121

Comment
One commenter showed strong support for the Draft Permit and attached his article, published in the September 19, 2002, issue of the *Sakonnet Times*. The article described the station's destructive effects on marine life and asked that BPS comply with § 316(b) of the CWA by installing closed-cycle cooling.

Response
This comment and the newspaper article have been noted. EPA has discussed the impacts on marine life of impingement and entrainment at BPS, as well as technology issues and other aspects of CWA § 316(b), elsewhere in this document.

Response #'s: VII.97	**Document #'s**: 1131

Comment
Another commenter discussed the many stressors on Mount Hope Bay. While the commenter supported EPA with respect to requiring the station to reduce water withdrawal and thermal loading, the commenter also believed that it is unreasonable to require the entire plant to be converted to closed-cycle cooling.

Response
EPA has considered the other possible stressors on aquatic life in Mount Hope Bay. The Agency does not believe that the existence of these other stressors means that BPS should not be required to reduce its own impacts on the bay in compliance with the CWA. Furthermore, other entities have taken steps to address the other significant stressors on Mount Hope Bay. Commercial and recreational fishermen have already been required to make significant sacrifices in an attempt to allow winter flounder stocks to recover. Proposed future restrictions will require fishermen to significantly reduce their catches even further. The City of Fall River is being required to upgrade its sewage treatment and increase its control of combined sewer overflows at a cost of well over $115 million.

Response #'s: VII.98	**Document #'s**: 1148

Comment
One commenter supported the Draft Permit but asked EPA to reconsider dry cooling as BAT under § 316(a) and BTA under § 316(b). The commenter acknowledged that EPA briefly considered dry cooling, but the analysis was abbreviated and not carried forward for more detailed analysis. The commenter listed several reasons for EPA to reconsider dry cooling:

- The land use pattern is likely to remain industrial for the long term (>50 years) and should be considered for the "long-term amortization schedule as part of the feasibility of a wholly disproportionate cost analysis."
- The Mystic and Fore River plants have expanded and have been retrofitted using dry cooling, and they are both in estuarine locations.
- Neither PG&E-NEG nor EPA has determined that dry cooling is infeasible at the site.
- If wet cooling is approved, then it will "likely result with attendant consequences on regulatory agencies, taxpayers, and the Mount Hope Bay ecosystem."
- Any siting of new steam electric generating stations in estuarine areas would probably be limited to facilities with dry cooling only.

Response
EPA believes that its analysis for dry cooling at BPS went far enough and has not pursued it further in response to comments. EPA agrees that the land use pattern is likely to remain industrial, but notes that it based its cost on the expected useful life of the equipment. EPA agrees that the above-mentioned facilities have been expanded and use dry cooling, but disagrees that the facilities have "retrofitted" existing cooling systems with dry cooling. These installations have involved new generating units being constructed at existing power plant sites.

EPA agrees that dry cooling has not been determined to be infeasible at the site, but EPA also has not determined it to be feasible at BPS. EPA found an example of a retrofit from open-cycle cooling to dry cooling. At a minimum, EPA continues to conclude that the engineering task would be extremely complex, resulting in costs well above those estimated for cooling towers. In addition, space constraints could preclude a complete dry cooling retrofit at BPS.

EPA disagrees that any siting of new facilities in estuarine locations would necessarily be limited to dry-cooled facilities. The Newington Power Plant in Newington, New Hamphire, is located in an estuarine area and has been permitted using wet cooling towers.

The economic and environmental consequences of closed-cycle wet cooling are discussed in detail elsewhere in this document.

Response #'s: VII.99	**Document #'s**: 1149

Comment
The commenter expressed concern that the 2.5-inch mesh size of the net required by the Draft Permit might not restrict the majority of juvenile fish and some anadromous fish from entering the discharge canal. The commenter recommended continued monitoring. The commenter was also concerned that the business confidentiality claim provisions (p. 27) of the Draft Permit may be applied to monitoring results.

Response
The mesh size of the net at the end of the discharge canal is not intended to keep fish of all sizes out of the discharge canal, since the velocity of the discharge stream itself tends to keep smaller fish out of the discharge canal. Moreover, when finer mesh nets have been used in the past, fish still managed to get into the discharge canal.

EPA's permit continues the current monitoring program that has been in place since 1972. The results of the monitoring program have always been, and will continue to be, a matter of public record.

Response #'s: VII.100	**Document #'s**: 1152

Comment
The commenter requested that the Draft Permit include the following restrictions to the allowance for once-through cooling water: "(1) reduce the flow and thermal discharge rates to those specified in MOA II, (2) limit its use to failure of the closed-cycle cooling system and periods of excessive fogging or icing, (3) limit the number of consecutive blocks of time once-through cooling may be used, and (4) prohibit its use during summer and biologically sensitive periods."

Response
EPA has prohibited the 122 hours of once-through cooling during the winter flounder spawning season (February 1 through May 31). EPA feels the adoption of this restriction is necessary to minimize the biological impact of the 122 hours of once-through cooling.

Response #'s: VII.101	**Document #'s**: 1154

Comment
One commenter noted that "a significant ancient Native American archaeological site is located within the BPS property" and that a Project Notification Form must filed with the Massachusetts Historical Commission if any new construction is proposed on the property.

Response

The ancient Native American archaeological site is actually located within the Somerset Station property upstream of BPS on the shore of the Taunton River.

Response #'s: VII.102	**Document #'s**: 1155

Comment

One commenter supported the Draft Permit and indicated that EPA correctly identified that the main issue of concern for minimizing impacts on EFH is the thermal discharge into the bay.

Response

This comment has been considered.

Response #'s: VII.103	**Document #'s**: 1158

Comment

The commenter was concerned that "the proposed monitoring protocols will not provide the best measure for documenting the restoration and sustainability of the Mount Hope Bay ecosystem." Specifically, the measures do not consider "loss and/or restoration of genetic variability (biodiversity)." This could be done by amending the monitoring requirements of the Draft Permit to use native populations that have adapted to the coastal waters of Massachusetts in the toxicity tests. Furthermore, testing protocols should include all life stages of the species used and field testing to determine whether and how fecundity is affected.

Response

EPA shares the commenter's concern regarding the genetic variability of populations in Mount Hope Bay. However, EPA does not believe that modifying for this specific permit a peer-reviewed toxicity test protocol that has been established for an entire category of regulated facilities is warranted. In addition, although information regarding effects on fecundity is important, there are currently no standard methods for examining this issue. Without the framework of peer-reviewed standard methods, any resulting analysis would have questionable value.

Response #'s: VII.104	**Document #'s**: 1161

Comment

The commenter believed that discharge and withdrawal limits will result in a violation of Rhode Island water quality standards. Permit conditions will violate State temperature and temperature-change requirements, and entrainment and impingement impacts associated with once-through cooling will violate the general criteria for the protection of aquatic life. The commenter requested the following changes to the Draft Permit:

- The permit should specify the analytical methodology used to evaluate compliance with the 0.2-ppm limit for the Spectrus CT1300.
- The permit should require a report on intake flow specifiying frequency and sample type.
- The permit should not allow calculation in place of sampling to determine cooling tower chemical use.
- The permit should clarify footnote 1 in parts A-6 and A-7, and describe how minimum detection levels will be applied to mass-based limits.

Response
EPA agrees that an analytical method should be included to determine compliance with the Spectrus CT1300 limit of 0.2 ppm and has specified the method in the permit. EPA also agrees that monitoring and reporting of the intake flow should be included in the permit, and it has been included. EPA disagrees that the permit should not allow the calculation of cooling tower chemical concentrations in lieu of sampling. The effluent guidelines found at 40 CFR Part 423 clearly allow this method of compliance determination.

EPA has changed the limits for copper and iron from mass-based limits to concentration-based limits and has therefore deleted footnote 1 from the Draft Permit section A.6 and A.7 (note the Final Permit renames these sections to A.8 and A.9 respectively).

Response #'s: VII.105	**Document #'s**: 1173, 1174

Comment
Commenters pointed out that the region has become dangerously dependent on gas as a fuel source since deregulation and the subsequent installations of new natural gas-fired plants.

One commenter indicated that ISO-NE predicts that by 2005, New England will be 65 percent dependent on gas. This dependence could have a serious adverse impact on the reliability and cost of energy. In addition, the current Draft Permit might cause the station to go out of business. One commenter urged that caution be used to protect the economy as well as the environment.

Response
EPA does not believe that this permit will result in BPS going out of business, or that the permit will affect fuel diversity in the region. EPA discusses these issues in response to comments on the use of coal elsewhere in this document.

Response #'s: VII.106	**Document #'s**: 1177

Comment
One commenter indicated that Mark Gibson's report was reviewed, discussed, and acknowledged by the Agency and the company in 1997. The commenter stated that all parties involved agreed that the data were real and the decline coincided with the changes in operation at the station. The commenter also pointed out that it is not necessary for anyone to prove that the company is the most significant factor in the decline in fish populations in the bay. The company is still allowed to withdraw 56 MGD and is also granted a variance of the State's thermal discharge limits. The commenter asked EPA to "enforce the narrative conditions in the current permit or modify the current permit and immediately require interim measures … ."

Response
EPA and other members of the TAC agree with the general conclusions of the 1996 Mark Gibson report. PG&E-NEG does not agree with its conclusions. EPA believes it has authority to take an enforcement action under the current permit, but as discussed elsewhere, EPA has chosen to focus its present efforts on developing a more protective and effective Permit for BPS. See responses elsewhere in this document for more detail.

Response #'s: VII.107	**Document #'s**: 1190

Comment

One commenter supported the permit and could not understand how others could attribute the higher water temperature in the bay to global warming. She indicated that it is her personal experience that the Mount Hope Bay is warmer than both Kingston Bay and Plymouth Bay.

Response
This comment has been considered.

Response #'s: VII.108	**Document #'s**: 1192

Comment
From personal observation one commenter believed that the bay is thriving and that the extent of the environmental controls in the Draft Permit is the result of the threat of a lawsuit. He also commented that there are many fish, cormorants, and fishers in the area.

Response
EPA has designed this permit to meet the requirements of the CWA with respect to thermal discharges and intake flows. The Agency discusses these legal requirements as well the state of the biological community of Mount Hope Bay in detail elsewhere in this document.

Response #'s: VII.109	**Document #'s**: 1193

Comment
One commenter stated that PG&E-NEG is using "scare" tactics to avoid spending the money to "clean up the plant." He also said that the issue "shouldn't even be about money" and mentions people's health and the legacy that is left to the citizens' grandchildren. He has personally seen the degradation of the bay over his lifetime.

Response
This comment has been considered.

Response #'s: VII.110	**Document #'s**: 1197

Comment
One commenter stated that he believes that the scientific evidence is compelling and questions why PG&E-NEG does not accept responsibility and correct the problem. He asked that PG&E-NEG "be a good corporate citizen" and that it is "time for action."

Response
This comment has been considered.

Response #'s: VII.111	**Document #'s**: 1198

Comment
One commenter supported the Draft Permit and told of his personal observation of the degradation of the Lee and Cole Rivers. The commenter believed that the products from burning "over 3 million tons of coal annually" (sulfur dioxide, nitrogen oxide, lead, mercury, and other heavy metals) are directly related to many health-related issues including asthma, pulmonary disease, and learning disabilities. He also commented that BPS is a "significant" and "noticeable" contributor to global warming.

Response
This comment has been considered.

Response #'s: VII.112	**Document #'s**: 1199

Comment
One commenter who supports the Draft Permit indicated it is "just common sense" that the use of a billion gallons per day by the plant will have "a catastrophic effect upon the existing fragile ecosystem" of Mount Hope Bay and that the science might not exist that would fully assess the total negative impacts. Furthermore, he stated that the cost is less than $12 per year to reduce "this ecological destruction by 96 percent" and questions how people could justify their nonaction to their children and grandchildren.

Response
This comment has been considered.

Response #'s: VII.113	**Document #'s**: 1201

Comment
One commenter indicated that the Draft Permit could possibly cause the plant to close, which would result in higher taxes. The higher taxes would be difficult for citizens and businesses, but they would be especially difficult for seniors in the community, who are more financially vulnerable. The commenter asked EPA to "balance" its approach and "please do not take a chance of imposing extraordinary remedies that could possibly wreak havoc on our small community."

Response
EPA does not believe that this action will cause the closure of BPS. This issue is discussed elsewhere in this document.

Response #'s: VII.114	**Document #'s**: 1208

Comment
One commenter indicated that "Rhode Island does stand by ready to initiate its own parallel state public nuisance action" and is prepared to discuss a resolution, although PG&E-NEG so far is unwilling to do so.

Response
This comment has been considered.

Response #'s: VII.115	**Document #'s**: 1211

Comment
One commenter stated that to protect the resource of Mount Hope Bay, it is first necessary that conditions be established for the return of a healthy resource, and only then can it be protected. The commenter indicated that DEM has no reason to overstate the problem, identify the wrong cause, or ignore multiple causes. They are only interested in their statutory mandate to solve the problem without hassling PG&E-NEG and without playing politics. The DEM does, however, object to understatement of the problem and to what it views as false claims regarding the causes of the problem. Not only was overfishing addressed by using restrictions but the collapse happened after this action was taken. The commenter vehemently disputed what he called PG&E-NEG's "misleading propaganda." The commenter explained how the current PG&E-NEG proposal will continue to cause harm and violate water quality standards. He also stated that the company is using intimidation and misrepresentation to avoid taking responsibility. Last,

the commenter indicated that by law, it is the company's burden to demonstrate that the Draft Permit is "more stringent than necessary to assure restoration of the resource" and that its "own proposal provides assurance that a balanced indigenous population can survive."

Response
This comment has been considered, and the issues regarding the health of Mount Hope Bay's biological community and the causes of its decline have been addressed elsewhere in this document.

Response #'s: VII.116	**Document #'s**: 1212

Comment
A group of commenters supported the Draft Permit and asked that BPS upgrade its facility with the existing technologies needed to end the destruction of the fragile ecosystem of Mount Hope Bay, which is "critical to the health and prosperity of our region."

Response
This comment has been considered.

Response #'s: VII.117	**Document #'s**: 1215

Comment
One commenter contended that, contrary to what other people have said, BPS is a necessary power plant in New England. The commenter said that power plants are put on-line for transmission and voltage supply rather than the energy they produce and that BPS is a "major player" in the role of supporting the New England grid. This commenter urged EPA to consider the need to preserve fuel diversity and low-cost, reliable power in the region.

Response
EPA has concluded that this permit will not cause the closure of BPS. In addition, EPA notes that the region currently has excess generation capacity. EPA responds to the issue of fuel diversity elsewhere in this document in response to comments on coal. The effect of EPA's action on the price of electricity is also discussed elsewhere in this document.

Response #'s: VII.118	**Document #'s**: 1217

Comment
One large group of commenters supported the Draft Permit, asked for continued monitoring, and also asked that improvements to the plant be made as soon as possible. Support is based on the unacceptable level of local impacts and the significant cumulative burden locally and regionally on both air and water resources.

Response
This comment has been considered.

Response #'s: VII.119	**Document #'s**: 1220

Comment
One commenter quoted from the October 1978 Environmental Impact Statement for BPS that "[i]n view of the importance of winter flounder, the close association of its spawning grounds to the coal pile runoff and the stress it is already under from entrainment and impingement, this impact should be considered

significant." The commenter believed that the decline in winter flounder "occurred simultaneously with the elimination of the land held chemical waste pond."

Response
EPA notes that coal pile runoff is contained and sent to the facility's wastewater treatment facility for treatment before it is discharged to Mount Hope Bay. EPA believes available information indicates that the decline of winter flounder occurred simultaneously with the increase of cooling water and heat discharge to the bay. EPA is unaware of any adverse environmental consequences associated with the "elimination of the land held chemical waste pond" but notes that the facility is required to treat chemical waste to an acceptable level before discharge to the environment, which eliminated the need for chemical ponds or lagoons.

Response #'s: VII.120	**Document #'s**: 1224

Comment
One commenter supported the Draft Permit and was concerned about the heat, chemicals, and biocides that are discharged into Mount Hope Bay and how it also affects the ecosystems of the five adjoining rivers. The commenter also called attention to the lack of blue crabs, horseshoe crabs, and eelgrass.

Response
EPA recognizes that the lower portions of the freshwater rivers that enter Mount Hope Bay are critical estuarine habitats that support spawning and the nursery habitat of many species. EPA's permit is drafted with these areas specifically in mind. See Chapter 6 of EPA's July 22, 2002, Permit Determinations Document for further details. As for the lack of blue crabs, horseshoe crabs, and eelgrass, the goal of EPA's Permit is to reduce adverse impacts from operations at BPS to an extent that will assure the protection and propagation of the BIP and allow for the recovery of the total Mount Hope Bay ecosystem. This includes more than just fish species; it includes the normal assortment of native species including crustaceans, aquatic vegetation, and other aquatic life (i.e., the BIP of Mount Hope Bay).

Response #'s: VII.121	**Document #'s**: 1229

Comment
One commenter alleged that the haze over BPS at dawn contains arsenic and mercury. The commenter believed that having breathed air downwind of the plant her whole life is the cause of her illness. The commenter asked if the station is a wholesale producer to other power companies as well as a local supplier of power. The commenter was concerned about the hazardous chemicals being discharged into Mount Hope Bay and did not believe there is overfishing in the bay.

Response
EPA has addressed concerns about air pollution, chemical discharges, and overfishing elsewhere in this document. EPA is unable to answer the commenter's question about whether BPS is a wholesale supplier or a local supplier of electricity but notes that the issue is not relevant to the issuance of this Draft Permit.

Response #'s: VII.122	**Document #'s**: 1230

Comment
One commenter supported the Draft Permit and was disturbed that "entrainment and the resulting destruction of uncounted larvae and juvenile fish" had not yet been addressed at the public hearing. Because he had not heard any "testimony on those economics," the commenter asked directly, "What is the value of that lost resource?" The commenter cited both the scientific data and observations of commercial and recreational fisherman as documenting the decline in fish populations.

Response

EPA agrees that fish populations in Mount Hope Bay have declined. EPA discusses economic analyses estimating the value of the fish elsewhere in this document.

Response #'s: VII.123	**Document #'s**: 1231

Comment

One commenter indicated that people who believe that the Draft Permit requires a choice between Mount Hope Bay and BPS are not correct. The Draft Permit provides "a strong step forward" for both. The commenter believed there was a consensus about the causes of decline in fish populations long before the Draft Permit. This commenter questioned the validity of some of the "last minute stuff" that the company has submitted and urged EPA to move forward without delay. In addition, the commenter declared that it is the company's "burden to demonstrate that they are not having a negative and substantial impact on the ecology of Mount Hope Bay" and that BPS has not done so.

Response

This comment has been considered.

Response #'s: VII.124	**Document #'s**: 1237

Comment

One commenter questioned whether the Draft Permit will be the solution to the problems in Mount Hope Bay and declared that "if the solution doesn't solve the problem, none of us are served." The commenter believed that EPA should reevaluate the facts to make sure they "have it right." This commenter also noted that a group named CERES rates companies in terms of social investment. They ranked 100 utility companies throughout the United States and PG&E-NEG was rated the third cleanest or "green"company out of the 100.

Response

EPA has carefully considered the extensive comments it received on the Draft Permit and believes it has correctly assessed the facts and applied the law. EPA notes that the commenter mischaracterized the work CERES did in regard to ranking utilities. CERES produced a report entitled *Benchmarking Air Emissions of the 100 Largest Electric Generation Owners in the U.S.—2000*. This report compiled air emission data (as reported to EPA from the companies) and reported it on a per megawatt generated basis. While this work is worthwhile, it did not conclude that "PG&E was rated the third cleanest or 'green' company out of 100." The report did rank PG&E-NEG as the third lowest producer of CO_2 emissions (pounds) per megawatt hour of electricity produced.

Response #'s: VII.125	**Document #'s**: 1239

Comment

One commenter pointed out that the bay is not owned by PG&E-NEG, yet they are "using the water to cool down their system as if it's a right, and now we're impeding on them because we're asking them to use it in a sensible manner. It's not theirs."

Response

This comment has been considered.

Response #'s: VII.126	Document #'s: 1240

Comment
One commenter indicated the PG&E-NEG bought the facility in 1998 and is investing $170 million to improve air emissions. The commenter also stated that the company has offered to invest another $60 million for water-based controls. The commenter wanted to make clear that the company is "committed to protecting the bay" but that it wanted to make sure that there is at least an equal return on its investments. The commenter, speaking for PG&E-NEG, asked EPA to look at the facts and the science and make a balanced decision that both protects the bay and jobs and continues to provide low-cost electricity.

Response
EPA has undertaken thorough and painstaking consideration of the relevant facts, science, and concerns surrounding this permit. EPA believes that the resulting permit is fair and protective and fully complies with the CWA.

Response #'s: VII.127	**Document #'s**: 1218

Comment
One commenter indicated that the EPA Fact Sheet, which was distributed at the informational and public meetings, was "misleading to readers" and that it "may bias readers toward believing that BPS is the largest influence on conditions in the Bay." The commenter believed that the "natural processes of seasonal heating and cooling and tidal flows have a far greater influence on the temperature" and that the input from the natural energy of the sun should have been compared to the heat input of BPS. The commenter also took issue with the EPA's description of the volume of one billion gallons. Furthermore, the commenter stated, that "the term 'eggs' is not equivalent to most people's concept of 'organisms'" and cites another permit where entrainment of large numbers of clam eggs did not have an adverse impact on a local ecosystem.

Response
EPA points out that the Fact Sheet the commenter cited should not be confused with the Fact Sheet prepared in support of the Draft Permit as required by 40 CFR 124.8 and 124.56. The document cited by the commenter was produced to provide general information and announce several public meetings and hearings. EPA is not required to respond to comments made regarding an informational brochure, but it does offer the following:

EPA does not agree that the EPA Fact Sheet was at all misleading to readers. After years of study, EPA has determined that BPS has a significant influence on the temperature of Mount Hope Bay. Additionally, EPA regards natural processes (e.g., sunlight, wind, rain, and tidal flow) as natural background conditions, and they are the baseline from which external (or man-made) influences are measured from, not an influence to use for comparing with. EPA believes that it is counterintuitive to claim that a natural environment or ecosystem has an influence on itself and, furthermore, to compare that influence with manmade negative influences and impacts on that same natural environment or ecosystem. Moreover, an extended temperature rise of 1.5 ˚F in this particular shallow estuary is a significant increase above "natural" conditions. EPA has documented evidence that the combination of both the rise in temperature and the removal of significant numbers of fish, larvae, and eggs daily by impingement and entrainment has had a significant impact on several fish species in Mount Hope Bay. Also, the Fact Sheet in question discussed other manmade influences on the bay and measures that have been taken to mitigate them (fishing management, sewage treatment, and CSO projects). Regarding the volume of water used by BPS on a daily basis, EPA compares the volume of the bay with the volume of water used daily by BPS to give readers a perspective as to how much water the plant uses. EPA does not agree that the volume of one billion gallons should have been compared to the natural flow of the bay, as the commenter opines. However, EPA is aware that Mount Hope Bay does have tidal influences. Regarding the commenter's feeling that the input from the natural energy of the sun should have been compared with the heat input of

BPS, again, EPA regards natural background levels of heat energy from the sun as an unadulterated level in which ecosystems naturally exist or thrive and should not be used for comparison with man-made influences above those natural levels. EPA also disagrees that, as the commenter stated, "the term 'eggs' is not equivalent to most people's concept of 'organisms'." EPA considers that each fish egg has "the capacity to develop into a new individual capable of independent existence." (*Merriam-Webster's Collegiate Dictionary, 10th Edition,* 1993). EPA acknowledges that fish do "produce gigantic numbers of eggs" because so few will survive. However, these eggs are a source of food in the natural ecosystem cycle and for human consumption, as the commenter pointed out. The Brayton Point Permit is based on highly site specific analyses. Therefore, EPA believes that it would be fallacious to compare the impacts on the organisms in Mount Hope Bay with the amount of clam eggs entrained through a New Hampshire plant or the amount of eggs consumed as food in a New York City restaurant.

Response #'s: VII.128	**Document #'s**: 1218

Comment
One commenter made the following three points:

- Correlations are not equivalent to causation, and treating them as such is erroneous.
- A large number of factors that affect fish populations were not examined. The commenter lists as examples climate variation, overfishing, variations in heat input, pathogens, chlorination, low dissolved oxygen levels, chemicals and pollution, an increase in predator species, competitor species, and habitat loss.
- The "theory of parsimony" is not reliable and Gibson's use of it is incorrect.

Response
EPA has consistently acknowledged that the analysis done by Gibson in 1996 does not establish a scientific cause and effect relationship. The only way to do that would be to shut down BPS, wait for fish stocks to return, and then restart the facility and observe any changes in fish abundance. EPA considered a suite of alternative explanations for the collapse of fish stocks in Mount Hope Bay, including global warming, overfishing, poor water quality, low dissolved oxygen, increase in predators, dredging, and brown tides. EPA's consideration of each of these factors is contained in its 316(a) and (b) Permit Determinations Document or elsewhere in this response to comments Document.

Finally, the 1996 Gibson analysis, including his use of the "theory of parsimony," survived a very thorough peer-review process. EPA acknowledges that Mount Hope Bay is a complex ecosystem, but its detailed 316(a) and (b) analyses support Gibson's original claim that BPS is having a dramatic impact on fish abundance in Mount Hope Bay.

VIII. Best Available Technology Standard-Based Thermal Discharge Limits

Response #: VIII.1-62	**Document #:** 1218

Just as the permittee cross-referenced between its comments regarding the development of CWA §§ 301/304 BAT technology-based effluent discharge limits and its comments regarding the development of the CWA § 316(b) cooling water intake limits, EPA has cross-referenced between its responses to these comments. This is appropriate because the technology that provides the basis for both sets of limits is the same—i.e., conversion/retrofit from open-cycle to closed-cycle cooling using mechanical draft wet cooling towers. As a result, many of the issues raised in each area are also the same. These include points related to cost estimates for technology implementation, engineering considerations, energy effects, and "other" environmental impacts (e.g., noise, aesthetics). Of course, there are also issues particular to each type of technology standard, and such issues are discussed only in the appropriate section of this response to comments.

1. Comment
PG&E-NEG stated that EPA Region 1's claim that closed-cycle cooling should be deemed BAT for controlling thermal discharges ignores applicable law and precedent, and that Region 1 has misapplied the CWA by misinterpreting and misapplying the concept of "best available technology" (BAT) set forth in CWA § 301. PG&E-NEG stated that the Draft Permit is based on a fundamental misinterpretation and misapplication of the applicable legal standard for determining BAT to reduce water withdrawals by and thermal discharges from a power plant.

Response
EPA disagrees. The Agency has paid careful attention to the law governing application of the BAT standard. See Chapter 4 of EPA's July 22, 2002, Permitting Determinations Document. EPA has addressed PG&E's specific objections regarding EPA's interpretation and application of the BAT standard as it relates to thermal discharges elsewhere in this document. The BAT standard does not apply to water withdrawals; therefore, EPA has not discussed BAT in relation to water withdrawals.

EPA also disagrees that its BAT determination for this permit is inconsistent with applicable precedent. This comment is addressed in detail both in Chapter 4 of EPA's July 22, 2002 Permitting Determinations Document and elsewhere in this response to comments.

2. Comment
PG&E-NEG stated that EPA Region 1 has misinterpreted and misapplied the legal standard for determining BAT under CWA § 301, "even though both EPA Headquarters and Region 1 have previously determined what BAT ... for units like [those at BPS] should be." PG&E-NEG states that EPA Headquarters determined in 1974 "and repeatedly since then" that BAT for units the size and age of BPS Units 1, 2, and 3 is open-cycle cooling.

Response
EPA disagrees that it has determined that BAT limits for controlling discharges of heat from all units of this size and age should be based on open-cycle cooling.

To begin with, EPA disagrees that the 1974 Effluent Guidelines and Standards for the Steam Electric Power Generating Point Source Category act as either an actual or a *de facto* BAT determination for units such as BPS units 1, 2, and 3 for several reasons. As discussed in § 4.1 of EPA's July 22, 2002, Permitting Determinations Document, these regulations were judicially remanded back to EPA in 1976 and have not been reissued. Therefore, they plainly do not apply to the current BPS permit. See *In the Matter of Public Service Company of New Hampshire (Seabrook Station, Units 1 & 2)*,1977 WL 22370 (p. 6), 1 E.A.D. 332, 10 ERC 1257 (U.S. EPA, NPDES Permit Application No. NH 0020338, Case No. 76-7, June 17, 1977) (Permit Appeal Decision by Administrator) ("The effect of the remand of the steam electric generation guidelines was, as urged by the Utilities, to require the Agency to determine what is BATEA for existing sources on a case-by-case basis under Section 402(a)(a)(1)"); *Status of the Initial Decision of Regional Administrator Where Appeal is Pending*, EPA GCO 77-1 (Jan. 11, 1977).

Furthermore, in EPA's view, the permittee misinterprets the intent of these proposed regulations by taking them out of context when it argues that the regulations would have established open-cycle cooling as BAT for the four generating units at BPS. The remanded regulations declared that BAT was **closed-cycle** cooling for units placed in operation after January 1, 1974, and units of greater than 500 megawatts capacity commencing operations between January 1, 1970, and January 1, 1974. 39 Fed. Reg. 36187-88 (Oct. 8, 1974). This would have applied to Unit 4 at BPS.[1] EPA also proposed "exempting" older units—i.e., units placed into operation **before** 1970, and units of 500 or more megawatt units placed into operation between January 1, 1970, and January 1, 1974—from the closed-cycle requirement. This was based on a number of practical considerations that EPA thought would apply to such units, rather than any finding that open-cycle cooling was the BAT for such units operating **over the long-term**. Indeed, EPA expressly rejected the suggestion that it exempt all existing units because doing so would allow units under construction in 1974, many of which would be large units, to keep discharging heat "past the year 2000." 39 Fed. Reg. 36188 ("Adopting a 'new source' cutoff would exempt units exceeding 1000 megawatts, some of which will still be operating, and discharging heat, **past the year 2000**") (emphasis added), *Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Steam Electric Power Generating Point Source Category*, EPA 440/1-74 029-a, p. 685 (Oct. 1974). The Agency concluded that plants expected to remain in operation, and thus to discharge heat, for decades to come should be subject to thermal control. *Id.* at 685.

EPA's decision to exempt the older units was based on the expectation, since proven incorrect, that units placed into operation before 1970 would have ceased operating, and therefore ceased discharging heat, before now. EPA never intended that units the age of BPS Units 1, 2, and 3, all of which commenced operations before 1970, would be allowed to discharge heat based on open-cycle cooling beyond the millennium. EPA assumed that units operating before 1970 would have significantly fewer remaining years of operation. Correspondingly, EPA also assumed that older units would discharge less heat to the environment on aggregate because of their short remaining lives and because older units typically operated only during periods of higher demand. 39 Fed. Reg. 36188; Development Doc. at 684. (In contrast, BPS's three older units are baseload generators.) EPA also recognized that the cost of retrofitting existing once-through units with closed-cycle cooling was greater than the cost of installing the same technology at new units and that the "capital costs expressed as a function of units of heat removed will be greater for older plants." 39 Fed. Reg. 36188. EPA also reasoned that because of the anticipated relatively short remaining life of the units, the cost of a retrofit would have to be amortized over a shorter period of time, increasing the percentage of the capital cost as compared against each unit of power generated. *Id.* Nevertheless, as stated above, EPA did not exempt all existing plants. Instead, EPA balanced its environmental protection mandate with cost considerations by setting the specified unit age exemptions described above. *Id.* Again, as explained, EPA did not want to exempt units from closed-cycle cooling that would be discharging heat for decades and after the year 2000. *Id.* 39 Fed. Reg. 36188.

[1] The permittee, of course, has never argued that it was bound by these regulations to provide closed-cycle cooling for Unit 4.

Plants that would be expected to operate past the millennium would discharge more heat and could be expected to more reasonably afford to retrofit to closed-cycle cooling.

When EPA looked to the 1974 regulation, as PG&E-NEG suggested, it found the selection of a cooling tower retrofit as BAT for BPS to be completely in accord with the intent and reasoning of the regulation given the history and current plans for the four main generating units at BPS. BPS Units 1, 2, 3, and 4 have all operated for many years longer than EPA anticipated for such units. BPS Units 1 and 2 commenced operations in 1963 and 1964, respectively, while Unit 3 began operations in 1969. Unit 4 actually began operations in 1974 and, therefore, would expressly have been required to meet limits associated with closed-cycle cooling as BAT. Moreover, all four units are expected to continue operating at least another 20 years or more. Furthermore, Units 1, 2, and 3 are baseload units (while Unit 4 runs less frequently). EPA certainly did not intend that any unit, regardless of age or size, that would be authorized to discharge heat based on open-cycle cooling would continue discharging heat for this long. For BPS, the expected life of the units allows adequate time to reasonably amortize the costs of retrofitting.

PG&E-NEG has also contended that EPA has "repeatedly" determined that open-cycle cooling is BAT for units the size and age of BPS Units 1, 2, and 3 since issuing the 1974 regulations. Once again, EPA must disagree. Before addressing this contention, however, the Agency will reiterate the regulatory framework that currently governs (and has since 1976) permitting for thermal discharges from steam electric power plants. The regulations issued by EPA in 1974 were remanded to the Agency in *Appalachian Power Co.* v. *Train*, 545 F.2d 1351 (4th Cir. 1976). EPA never repromulgated these standards. In an opinion concerning the Seabrook power plant in New Hampshire that was issued following *Appalachian Power*, EPA's Office of General Counsel (OGC) concluded that the effluent limitations remanded by *Appalachian Power*, which had clearly applied to the Seabrook facility as an existing source, no longer applied to the facility. *Status of the Initial Decision of Regional Administrator Where Appeal is Pending*, EPA GCO 77-1 (Jan. 11, 1977). In other words, the remanded regulations had no effect unless repromulgated. EPA OGC further found that EPA could either issue permits based on best professional judgment (BPJ), "[i]n the absence of effluent limitations guidelines" or repromulgate the regulations. *Id.* See also *In Re Central Hudson Gas & Electric Corp.*, EPA GCO 63 (July 29, 1977) (finding that, because an overturned regulation obviously cannot be applied to a discharger, EPA may issue permits on a case-by-case basis under CWA § 402(a)(1)).[2] Courts have long agreed that CWA § 402(a)(1) authorizes EPA to issue discharge permits on a case-by-case basis using BPJ where effluent limitations guidelines (ELGs) do not exist for either a point source category as a whole or for a particular pollutant not addressed by the ELGs promulgated for the point source category. See, e.g., *NRDC* v. *EPA*, 822 F.2d 104, 111 (D.C. Cir. 1987) ("If no national standards have been promulgated for a particular category of point sources, the permit writer is authorized to use, on a case-by-case basis, 'best professional judgment' to impose 'such conditions as the permit writer determines are necessary to carry out the provisions of [the Clean Water Act].") (citations omitted) (industry and environmental group challenge to 1979 revisions to NPDES regulations); *American Petroleum Inst.* v. *EPA*, 787 F.2d 965, 969 (5th Cir. 1986) ("Where EPA has not promulgated applicable technology-based effluent limitations guidelines, the permits must incorporate, on a case-by-case method, 'such conditions as the Administrator determines are necessary to carry out the provisions of the Act.'") (citations omitted). Because no ELGs exist for thermal discharges from facilities within the steam electric power plant category, EPA must use BPJ on a case-by-case basis to select BAT effluent limits for BPS.

[2] CWA § 402(a)(1) authorizes EPA to "issue a permit for the discharge of any pollutant, or combination of pollutants ... upon condition that such discharge will meet either (A) all applicable requirements under sections 1311, 1312, 1316, 1317 1318, and 1343 of this title, or (B) prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines are necessary to carry out the provisions of this chapter." 33 U.S.C. § 1342(a)(1). See also 40 C.F.R. § 125.3.

Turning to a factual analysis of PG&E's claim, EPA is unaware of any decisions by EPA headquarters holding that open-cycle cooling is generally considered BAT for units the size and age of BPS Units 1, 2, and 3. PG&E-NEG also failed to cite any such determination by EPA headquarters, Region 1, or any other region. PG&E-NEG referred to a single permit, issued in Region 4 for Florida Power and Light's Cape Canaveral Plant, to argue that EPA rejected closed-cycle cooling on the basis of non-water quality adverse environmental impacts and the age of the unit. See BPS Comments by Foley Hoag, p. 32, n.70. Yet, the decision on the Cape Canaveral permit's thermal discharge limits was expressly issued under CWA § 316(a), rather than under § 304 BAT standards. Moreover, the decision took Endangered Species Act issues into account as well. The grounds for EPA Region 4's decision not to require closed-cycle cooling for the Cape Canaveral plant under CWA § 316(a) plainly have little, if anything, to do with issues relevant to EPA Region 1's determination of BAT technology-based thermal discharge standards for BPS. In the Cape Canaveral decision, EPA did not cite facility age as a reason to reject closed-cycle cooling at this plant; the Agency did not discuss age beyond simply noting the years in which each unit began operating. EPA rejected closed-cycle cooling at the plant largely because the resulting reduction in thermal effluent would have harmed a significant local population of manatees, which are protected under the Endangered Species Act. In the Matter of Indian River Plant, Finding and Determination Under 33 U.S.C. § 1326, NPDES Permit Nos. FL0000680 and FL0001473, pp. 5-6 (July 11, 1983). There are no manatees or other protected species in Mount Hope Bay that will be harmed by a reduction in thermal effluent. The site-specific § 316(a) variance determination for the Cape Canaveral plant was rendered based upon facts very different from those that apply for BPS, and it is not relevant to EPA's BAT determination for BPS.

As is the case with all BPJ-based permits, EPA must select BAT for controlling thermal discharges at BPS based on the technology that is available, economically achievable, and most effective at BPS. As discussed in later responses, EPA is not expected to achieve absolute uniformity in setting effluent standards in BPJ-based permits. Rather, EPA must decide how it will balance the goal of imposing roughly uniform standards on facilities within a particular point source category with the overriding purpose of the CWA to eliminate the discharge of pollutants to the nation's waters. See, e.g., *NRDC* v. *EPA*, 859 F.2d at 199-200 (holding that EPA has discretion to decide the balance between CWA's overall goal of eliminating discharges of pollutants and its subsidiary goal of regulating dischargers in a uniform manner, and that holding some dischargers to a higher standard does not violate the CWA). The BAT provision itself was designed to "use the latest scientific research and technology in setting effluent limits, pushing industries toward the goal of zero discharge as quickly as possible." *Kennecott* v. *U.S. EPA*, 780 F.2d 445, 448 (4th Cir. 1985), citing *A Legislative History of the Water Pollution Control Act Amendments of 1972*, 93d Cong., 1st Sess. (Comm. Print 1973), at 798. Clearly, the purpose of setting BAT-based effluent limits is to make further progress toward eliminating discharges of pollutants—not merely to maintain the status quo. The limits set by prior BPJ-based BAT permits might be a useful reference for EPA's assessment of BAT for a different facility, but they are not binding on its determination for that facility.

Finally, BPS's own permitting history demonstrates that EPA has long expressed concern over the facility's thermal impacts on Mount Hope Bay.[3] The first NPDES permit issued for BPS in 1973 required closed-cycle cooling for Unit 4 and imposed a maximum temperature limit of 90 °F, due at least in part to concerns over thermal discharge impacts. Although these limits were later made less stringent, this was done pursuant to a CWA § 316(a) variance request from the permittee and not as the result of a technology-based determination that open-cycle cooling constituted BAT for BPS. Moreover, many

[3] See Chapter 3 of EPA's July 22, 2002, Permitting Determinations Document for a full discussion of BPS's permitting history.

factors have changed since those earlier variance requests were granted. These issues are discussed in more detail elsewhere in this response to comments and in EPA's July 22, 2002, Permit Determinations Document.

3. Comment
PG&E-NEG states that EPA Region 1 has departed from its long-standing practice in the application of CWA § 301(b)(2) (requiring BAT for managing thermal discharges).

Response
EPA disagrees that the Agency has departed from any "long-standing practice" in applying § 301(b)(2).[4] As explained above, and in Chapter 4 of EPA's July 22, 2002, Permit Determinations Document, EPA develops BAT-based permit limits for thermal discharges on a case-by-case basis using BPJ. In accordance with CWA § 301(b)(1)(C), the permit's limits must then be set based either on the BAT-based limit or on limits based on State water quality standards, with the more stringent standard governing. Limits based on either technology standards or water quality standards may be set aside, however, if limits based on a CWA § 316(a) variance are determined to be appropriate. EPA may grant such variance-based limits if the less stringent limitations will nevertheless be sufficient to "assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife" in and on the receiving waterbody. 33 U.S.C. § 1326(a).

EPA has followed the above-described statutory scheme in developing the thermal discharge limitations for the BPS permit. EPA was unable to determine which CWA requirements would form the basis of the thermal discharge limitation without performing an analysis of technology-based limits, water quality-based limits, and alternative § 316(a) variance-based limits. Therefore, EPA assessed all three bases for discharge limitations, but ultimately based the thermal discharge limits in the permit on a § 316(a) variance. The application of § 316(a) to the new BPS permit is discussed in detail in Chapter 6 of EPA's July 22, 2002, Permit Determinations Document and elsewhere in this response to comments.

EPA did not depart from any "long-standing practice" in using BAT standards to evaluate thermal effluent limitations.[5] It simply continued its practice of assessing each permit on a case-by-case, BPJ basis under CWA § 402(a)(1). The circumstances of each facility and its receiving waters determine whether EPA will base effluent limitations on BAT, water quality standards, or a § 316(a) variance. Differing circumstances from facility to facility will naturally result in different effluent limitations. Nothing in the CWA guarantees that every facility will be required to meet the exact same standard. In fact, such a requirement would defeat the purpose of the CWA to reach zero discharge as quickly as possible. See, e.g., *Kennecott*, 780 F.2d at 448. See also *American Frozen Food Inst.* v. *Train*, 539 F.2d 107, 124 (D.C. Cir. 1976) ("The principal purpose of the [CWA] is to achieve the complete elimination of all discharges of pollutants into the nation's waters...."), *NRDC* v. *U.S. EPA*, 859 F.2d 156, 199-201 (D.C. Cir. 1988) ("although exalting the value of uniformity, the statute simply does not *require* uniformity in all circumstances." (emphasis in original)).

The permittee cites two cases to support its proposition that EPA has impermissibly ignored "established precedent" in previous permits, though the permittee does not specify what it believes that precedent to be. Neither case supports the permittee's position. The first, *Massachusetts Dep't of Educ.* v. *U.S. Dep't*

[4] It is not entirely clear from PG&E's comments what the company believes this "long-standing practice" to be, especially in view of EPA's case-by-case approach to setting BAT technology-based limits for thermal discharges.

[5] Requiring closed-cycle cooling is not a complete departure from precedent at the plant because the first permit ever issued for BPS required closed-cycle cooling for Unit 4.

of Educ., 837 F.2d 536 (1st Cir. 1988), involved a dispute over how Massachusetts had allocated Federal special education funds. The court found that the Department of Education's prior decision dealt with a different type of accounting issue and that, in this case, the Department had properly distinguished its prior decision. *Massachusetts Dep't. of Educ.*, 837 F.2d at 544. Thus, the Agency's decisions did not need to be uniform in every case. In the second case, *Davila-Bardales* v. *INS*, the court remanded a Board of Immigration Appeals decision regarding the admissibility of statements made by an unaccompanied minor because the decision directly conflicted with a previous decision made on the same issue and involving virtually identical facts. *Davila-Bardales* v. *INS*, 27 F.2d 1, 4-5 (1st Cir. 1994). Yet, here the court was also careful to note that

> [t]his is not to say that an agency, once it has announced a precedent, must forever hew to it. Experience is often the best teacher, and agencies retain a substantial measure of freedom to refine, reformulate, and even reverse their precedents in the light of new insights and changed circumstances.

Id. at 5 (citations omitted). This case also does not support the permittee's position. EPA has acted consistent with its precedent of making case-by-case, BPJ technology-based determinations in the absence of a National Effluent Limitations Guideline, and EPA has properly explained the basis of its decision in this case.

EPA's permit determination for BPS also presents a distinctly different legal scenario than those presented in the two cases cited by the permittee. Instead of applying a single rule to very similar sets of facts, EPA must determine case-by-case BAT limits for thermal effluent by applying one set of factors to myriad different factual situations. At least one court has specifically distinguished between "conflicting interpretations of the same regulation in almost identical factual situations," and divergent agency determinations based on the application of the same regulation to differing sets of facts. See *McDonnell Douglas Corp.* v. *Nat'l Aeronautics & Space Admin.*, 895 F. Supp. 319, 324 (D.C. Dist. 1995) (*distinguishing Davila-Bardales* v. *INS*, 27 F.2d at 5), *vacated on other grounds by McDonnell Douglas Corp.* v. *Nat'l Aeronautics & Space Admin.*, 88 F.3d 1278 (D.C. Cir. 1996). In *McDonnell Douglas*, the court held that NASA did not act arbitrarily in issuing "inconsistent" decisions regarding the release of information for separate FOIA requests because each request involved "a multitude of variables" that demanded individual consideration. The court concluded that the agency "[did] not overturn a rule or policy" simply because its consideration of the same factors did not lead to the same result in every case. *Id.* Similarly, EPA must consider the same factors in setting BAT limits for each individual permit applicant, but it need not reach the same conclusion for each after taking the facts of each case into account.

Even if EPA's determination of BPS's thermal effluent limitations could somehow be interpreted as a break with precedent, and the Agency does not agree that it could be, EPA's actions are wholly within lawful agency discretion. It is a basic principle of administrative law that an Agency must explain a decision that departs from past practice. It is an equally basic principle that an agency has discretion to depart from past practice so long as the agency's explanation shows that the decision is reasonable under the law and facts. *Motor Vehicle Manuf. Assoc.* v. *State Farm*, 463 U.S. 29, 42 (1983) ("an agency must be given ample latitude to 'adapt their rules and policies to the demands of changing circumstances,'" quoting *Permian Basin Area Rate Cases*, 390 U.S. 747, 784 (1968)); *Shaw's Supermarket* v. *NLRB*, 884 F.2d 34, 41 (1st Cir.1989) (an agency is "free to modify or change its rule; to depart from, or to keep within, prior precedent, as long as it focuses upon the issue and explains why change is reasonable"). EPA has carefully considered each of the pertinent issues raised in the BPS permit. The Agency has reviewed and analyzed the voluminous information submitted to it, conducted independent analysis of this information, and sought other information as appropriate. Having reached its decision, EPA exhaustively explained the options it considered, the information upon which it relied, and the reasoning behind its decision. See Chapter 4 of EPA's July 22, 2002, Permit Determinations Document. EPA believes that it has far surpassed the standard set forth by the Supreme Court when it stated that it would "uphold a decision of less than ideal clarity if the agency's path may be reasonably discerned." *Bowman Transp., Inc.* v. *Arkansas-Best Freight System*, 419 U.S. 281,286 (1974).

4. Comment
PG&E-NEG stated that EPA regulations require the Agency to consider not only the individual facility in question, but also the "appropriate standard for the class or category of point sources" to which the individual facility belongs, when applying BPJ to develop a BAT limit.

Response
EPA agrees that it must consider "the appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information" when developing a BPJ-based BAT effluent limit. 40 CFR § 125.3(c)(2)(i). Indeed, EPA has done this. As explained in § 4.2.3a of EPA's July 22, 2002, Permit Determinations Document, BAT is to be based on the "single best performing plant in an industrial field" (citations omitted). EPA Region 1 concluded that retrofitting existing power plants to closed-cycle cooling constitutes BAT for thermal effluent discharges from this category or class of point sources. EPA then went further, however, as the permittee concedes, to assess whether this generally appropriate BAT would in fact be the BAT applicable to BPS, specifically in light of the facts of this case. Again, the Agency concluded that it would be. All of this is detailed in Chapter 4 of EPA's July 22, 2002, Permit Determinations Document and is further discussed in this response to comments.

EPA also notes that although Congress intended for the Agency to apply CWA technology standards in as uniform a manner as is feasible, Congress did **not** intend that EPA sacrifice fulfillment of the CWA's overriding purpose of eliminating the discharge of pollutants into the nation's waters by requiring all BPJ technology-based determinations to hold facilities to exactly the same standard. *American Frozen Food Inst.* v. *Train*, 539 F.2d 107, 124 (D.C. Cir. 1976) ("The principal purpose of the [CWA] is to achieve the complete elimination of all discharges of pollutants into the nation's waters. . ."); *NRDC* v. *U.S. EPA*, 859 F.2d 156, 199-201 (D.C. Cir. 1988) ("although exalting the value of uniformity, the statute simply does not *require* uniformity in all circumstances" (emphasis in original)).[6] The requirement that BAT standards be based on the "single best performing plant in an industrial field" clearly demonstrates that the goal of reducing discharges supercedes the subsidiary goal of applying uniform standards. *CMA* v. *EPA*, 870 F.2d at 239, *citing* 1972 Legislative History at 170. See also *Kennecott* v. *U.S. EPA*, 780 F.2d 445, 448 (4th

[6] PG&E-NEG cites two cases to support its argument that EPA must place a high priority on uniformity. Neither of these cases, however, suggest that uniformity must necessarily supercede limits that would otherwise be set based on the applicable technology standard (in this case BAT) applied on a case-by-case basis. For example, the court in *NRDC* v. *EPA*, 863 F.2d 1420, 1427 (9th Cir. 1988), concluded that EPA had reasonably exercised *its discretion* not to require a particular technology as BAT in a BPJ general permit for a particular small group of facilities because the Agency was working on national standards that it believed might be less stringent than the proposed BPJ BAT standard and that would otherwise apply to the facilities in question. In the instant case, however, EPA is not working on any national standards for thermal discharges at this time. Moreover, although the court agreed that EPA acted reasonably in NRDC, it did not suggest that EPA **had to** exercise its discretion in this manner, and it certainly did not conclude that the goal of uniformity prohibits EPA from requiring an individual plant to spend more than others as the result of a BPJ-based technology standard. In *E.I. duPont de Nemours & Co.* v. *Train*, 430 U.S. 112, 129-30 (1977), the court discussed the goal of uniformity in the context of setting BPT limits, stating that the balancing test between total cost and effluent reduction benefits is intended to maintain uniformity within a class and category of point sources subject to effluent limitations. This discussion, however, was focused on the significance of the goal of uniformity in determining national BPT standards under CWA § 304(b)(1)(B), not the significance of uniformity in setting case-by-case BPJ-based BAT limits.

Cir. 1985), citing A Legislative History of the Water Pollution Control Act Amendments of 1972, 93d Cong., 1st Sess. (Comm. Print 1973), at 798 ("The BAT standard reflects the intention of Congress to use the latest scientific research and technology in setting effluent limits, pushing industries toward the goal of zero discharge as quickly as possible").

5. Comment

PG&E-NEG stated that in 1976 the Fourth Circuit Court of Appeals set aside EPA's 1974 proposed regulation establishing retrofits to closed-cycle cooling as BAT for a small subset of the newest, largest generating units. According to PG&E, the Fourth Circuit struck down the EPA regulation as too stringent and stated that "EPA had improperly failed to compare the costs and benefits of its retrofit requirement to the costs and benefits of other available technologies" (citing to *Appalachian Power* v. *Train*, 545 F.2d 1351, 1366 (4th Cir. 1976)).

Response

First, it should be underscored that to the extent that *Appalachian Power* can be read to support an argument that a comparative cost-benefit analysis is required in setting BAT limits, the case is no longer good law. Subsequent court decisions, including a decision by the United States Supreme Court, have made clear that a cost-benefit comparison is **not** required in this context. See, e.g., *EPA* v. *Nat'l Crushed Stone Assoc'n*, 449 U.S. 64, 71-72 (1980) ("Similar directions [to those for assessing BPT under CWA § 304(b)(1)(B)] are given the Administrator for determining effluent reductions attainable from the BAT except that in assessing BAT total cost is no longer to be considered in comparison to effluent reduction benefits."); *Texas Oil & Gas Ass'n* v. *U.S. EPA*, 161 F.3d 923, 936 (5th Cir. 1998) ("In applying the BAT standard, the EPA is not obligated to evaluate the reasonableness of the relationship between costs and benefits"); *Reynolds Metals Co.* v. *U.S. EPA*, 760 F.2d 549, 565 (4th Cir. 1985) ("as regards BAT... no balancing is required—only that costs be considered along with the other factors [in CWA § 304(b)(2)(B)]"); *Association of Pacific Fisheries* v. *EPA*, 615 F.2d 794, 818 (9th Cir. 1980) ("the conspicuous absence [from CWA § 304(b)(2)(B)] of the comparative language [regarding costs and benefits] contained in section 304(b)(1)(B) leads us to the conclusion that Congress did not intend the Agency or this court to engage in marginal cost-benefit comparisons"). See also § 4.2.3b of EPA's July 22, 2002, Permitting Determinations Document.

Second, EPA disagrees with PG&E's characterization of the *Appalachian Power* decision. The court in *Appalachian Power* set aside EPA's regulations requiring certain existing facilities to "backfit" closed-cycle cooling **not** because the requirements were too stringent, but rather because EPA had not adequately supported its conclusions on the record. See 545 F.2d at 1365-66 (generally noting that EPA's conclusion that backfitting cooling devices on existing equipment would be required based on size and age of generators seemed reasonable, but remanding because EPA had not provided sufficient evidence in the record to support its result). On remand, therefore, the court required EPA to explain the benefits or expected benefits, especially to aquatic life, of the various alternatives considered and the scientific opinion it relied upon. 545 F.2d at 1365. Notably, the court expressly rejected the industry's contention that the benefits of the regulations needed to be quantified in monetary terms. *Id.* at 1361 ("such benefits often cannot be reduced to dollars and cents"). In explaining EPA's statutory mandate, the court stated that EPA must "consider the benefits derived from the application of its effluent reduction requirements in relation to the associated costs" to determine whether its regulations would achieve "reasonable further progress toward the national goal of eliminating the discharge of all pollutants" consistent with BAT. *Id.* The court found that EPA had failed to do enough in evaluating the benefits to support a determination of whether "a particular [thermal discharge] reduction level is, in fact, reasonable," and that to judge that reasonableness "EPA must compare the cost of achieving that level of reduction . . . and the ecological benefits to be derived therefrom . . ." *Id.* at 1364. At the same time, the court noted that whether a particular reduction was reasonable or not was "ultimately a matter within the sound discretion of EPA itself." *Id.*

It is important to note the court's statement that the "remand here is very narrow in scope since we do not disapprove the general principle of requiring installation of cooling devices on a part of the planned and existing electrical generators in the country." *Id.* at 1365. The court also noted that the fact that the costs of meeting thermal reduction requirements could be burdensome for a permittee does not mean that they are unreasonable. *Id.* at 1365 n. 32 ("the mere fact that these regulations will bring added pressure to bear is not a sufficient basis upon which this court may conclude that EPA has acted arbitrarily"). Furthermore, the court observed that the record was "replete" with references to the adverse effects of heat on aquatic life, including references provided by experts on both sides of the case. *Id.* at 1363-64.

Thus, even assuming that *Appalachian Power* is good law, the case does not support the permittee's position. *Appalachian Power* held that EPA must consider costs in relation to benefits as a way to determine whether thermal discharge limitations would result in "reasonable progress" towards the goal of eliminating the discharge of pollutants into the nation's waters. The case did **not** reject backfitting existing facilities to closed cycle cooling as BAT, nor did it establish a strict comparison of monetized benefits against costs as the appropriate economic test under the BAT standard. In any case, as discussed above, subsequent court decisions have rejected the economic test for BAT pronounced by the *Appalachian Power* court and made clear that a cost-benefit analysis is not required for the development of BAT limits.

6. Comment
PG&E-NEG stated that EPA has never reissued the BAT standard that was remanded in 1976, that there is no evidence that EPA has used a BPJ-based BAT determination to require any other existing plant to retrofit to closed-cycle cooling (i.e., to set a thermal discharge limit based on closed-cycle cooling as BAT), and that "[o]n a national basis, EPA's prolonged silence since 1976 indicates that it still considers open-cycle cooling or once-through cooling to be BAT for such power plants."

Response
EPA disagrees that either any BPJ-based permits for other plants or "silence" regarding reissuance of a national BAT standard for power plants in any way indicates that the Agency regards open-cycle cooling to be BAT for BPS or power plants like it. EPA's remanded regulations are not now in effect and did not, in any event, intend that open-cycle cooling was BAT for units such as those at BPS. In the absence of national guidelines, EPA makes case-by-case BAT determinations. See, e.g., *American Mining Congress* v. *U.S. EPA*, 965 F.2d 759, 767 (9th Cir. 1992) (addressing EPA's regulation of discharges from inactive mines) ("EPA's decision not to promulgate effluent guidelines for a category of sources does not mean that those sources are exempt from permitting requirements . . .[it] means only that permits for such discharges are issued on an individual basis.") Furthermore, the permittee did not cite any cases where EPA set BPJ-based BAT limits based on open-cycle cooling. The fact that limits less stringent than what could be achieved by closed-cycle cooling might have been set based on variances under CWA § 316(a)—as has been done in this case—does not determine what BAT limits would require. Moreover, EPA points out that EPA's proposed thermal effluent guidelines would have required BPS Unit 4 to operate in a closed-cycle manner, but neither the permittee nor EPA has argued that this was required once the regulations were withdrawn.

7. Comment
PG&E-NEG stated that there is no support for the position that closed-cycle cooling is BAT for steam generating units the size and age of those at BPS.

Response

EPA disagrees. The Agency has provided ample support for its case-by-case BPJ determination of BAT limits for BPS in Chapter 4 of EPA's July 22, 2002, Permit Determinations Document. Additional support is further provided in this response to comments. As the courts have stated, ". . . BPJ limitations are as correct and as statutorily supported as permit limits based upon an effluent limitations guideline." *NRDC* v. *EPA*, 859 F.2d at 199. Also, setting a BPJ-based technology standard for a specific facility does not require development of a nationally applicable standard for all similar facilities.

EPA has offered ample evidence to support its determination that closed-cycle cooling is BAT for the units at BPS. EPA evaluated a number of technologies available for reducing thermal discharges from steam electric power plants, including wet and dry cooling towers, hybrid towers, mechanical- and natural-draft cooling towers, helper cooling towers, piggyback cooling, and generation curtailment. EPA considered how each of these options might be implemented (i.e., retrofitted) at BPS and assessed their likely effectiveness in controlling thermal discharge. Part of this assessment involved examining the BPS facility and the engineering aspects of implementing unit-specific and multi-mode cooling tower options at BPS. EPA then conducted a detailed analysis to estimate the potential costs of these options. EPA not only considered PG&E's cost estimates, but also performed independent analyses to fully and accurately assess the costs involved. Finally, EPA also considered non-water quality environmental impacts and other relevant impacts (such as traffic safety, noise, energy effects) consistent with the CWA. In addition, EPA has made certain revisions to its analyses in response to comments. These matters are discussed in detail elsewhere in this response to comments.

The majority of PG&E's objections to the closed-cycle cooling BAT standard at BPS appear to rest on the assertion that a closed-cycle cooling retrofit has not been undertaken at a station identical to BPS. Yet, EPA believes it has provided a number of appropriate examples of cooling towers being retrofitted to large existing power plants to convert them from open-cycle to closed-cycle cooling. (The permittee's comments about these examples are discussed elsewhere in this response to comments.) Moreover, as we discussed in Chapter 4 of EPA's July 22, 2002, Permit Determinations Document, a technology need not necessarily have been implemented at a full scale facility in order to qualify as an "available" technology. See, e.g., *Ass'n of Pacific Fisheries*, 615 F.2d at 816-17, *quoting* 1972 Leg. Hist. at 170.

PG&E-NEG has failed to offer any specific, substantive reason why closed-cycle cooling would not be BAT at BPS. The fact that retrofitting might be expensive and difficult does not, as PG&E-NEG has suggested, place it beyond the realm of BAT. Congress was aware that BAT standards would often be expensive and difficult for dischargers to implement and chose to strike a regulatory balance in favor of pushing for progress toward eliminating the discharge of pollutants. See, e.g., *American Iron and Steel Inst.* v. *EPA*, 526 F.2d 1027, 1052 (3rd Cir. 1975) ("while it is clear that the Administrator must consider cost, some amount of economic disruption was contemplated as a necessary price to pay in the effort to clean up the nation's waters, and the Administrator was given considerable discretion in weighing costs"). The information available to EPA, both from the applicant and from other sources, demonstrates that closed-cycle cooling is effective for reducing pollutant discharges, and is technologically and economically achievable at BPS.

8. Comment

PG&E-NEG stated that EPA's statement that wet, dry, and wet/dry cooling tower technologies are generally available "for use at power plants" is conclusory and does not establish that these technologies are considered BAT on a national basis.

Response

EPA's conclusions regarding the general availability of these technologies were not conclusory. These conclusions were based on proper consideration of relevant facts and law. In addition, EPA did not purport to establish that these technologies constitute BAT on a national basis.

EPA has conducted a case-by-case BPJ determination of BAT for the BPS permit. The question of whether a technology is generally "available" for a plant or industry is one part of determining whether the technology might constitute BAT. By examining the "availability" of cooling tower technologies, EPA never suggested that these technologies necessarily constituted BAT for the steam electric power plant category as a whole. EPA also noted that while available, "[n]one of these technologies is automatically considered BAT [for BPS] under the current case-by-case approach to reducing thermal discharge from new or existing steam electric power plants." EPA's July 22, 2002, Permit Determinations Document, p. 4-23. EPA simply noted that these technologies perform best for reducing the discharge of thermal effluent and are **available** for use at power plants and, therefore, are appropriate technologies for EPA to examine when selecting BAT for BPS.

The CWA does not define "available" as used in the BAT standard. However, consistent with the legislative history, the courts have interpreted the term to refer to any existing technology that has been either implemented successfully at one or more plants in the same industrial category, implemented successfully in a different industrial category from which the technology could be transferred, or demonstrated by scientific research to be effective in reducing a particular pollutant. See, e.g., *CMA* v. *EPA*, 870 F.2d at 239, 240 (a technology may be considered "available" if at least one discharger within the relevant category demonstrates the technology's effectiveness); *American Petroleum Inst.* v. *U.S. EPA*, 858 F.2d 261, 265 (5th Cir. 1988) (under certain circumstances "a process is deemed 'available' even if it is not in use at all") (citing *Association of Pac. Fisheries* v. *EPA*, 615 F.2d 794, 816 (9th Cir. 1980)); *Kennecott* v. *U.S. EPA*, 780 F.2d 445, 453 (4th Cir. 1985), citing *Reynolds Metals Co.* v. *EPA*, 760 F.2d 549, 562 (4th Cir. 1985) (holding that EPA did not act arbitrarily in selecting sulfide precipitation as BAT for the primary base metals industry, though the conditions at the model plants EPA pointed to as examples of availability were different) ("Congress contemplated that EPA might use technology from other industries to establish the BAT. Progress would be slowed if EPA was invariably limited to treatment schemes already in force at the plants which are the subject of the rulemaking." (internal citations omitted)). See § 4.2.3a of EPA's July 22, 2002, Permit Determinations Document.

Under these tests, EPA properly determined that wet, dry, and wet/dry cooling tower technologies are generally "available" for power plants. EPA reviewed Agency technology studies, consulted with engineers at a number of steam electric power plants, and reviewed EPA's prior research on the technologies used for thermal effluent reduction. See *Id.* at § 4.3.2. Having found that all three cooling tower technologies were already in use at steam electric power plants around the nation, EPA properly determined that the technologies were generally available and should be assessed for use at BPS. EPA also found that a number of large existing power plants had been retrofitted with wet mechanical-draft cooling towers in the process of converting from open-cycle to closed-cycle cooling. Thus, whether looking at the specific industry category (i.e., existing power plants) or at another category for "transfer technology" (e.g., new power plants), EPA had a sound basis for concluding that wet mechanical draft cooling towers represented available technology to consider for BPS. Upon more detailed consideration, EPA decided that it was unclear whether dry cooling was feasible for a retrofit at BPS since no cases of such a retrofit were found and the option posed other difficulties as well. Therefore, EPA did not base BAT limits for BPS on dry cooling.

9. Comment
PG&E-NEG stated that EPA has improperly failed to compare the costs and benefits of alternative heat reduction technologies.

Response
EPA disagrees with the permittee's characterization of the cost consideration required for developing BAT limits. The Agency also disagrees with the assertion that EPA has not properly considered costs in setting BAT limits for the BPS permit. EPA has discussed the legal issues raised by this comment in detail in Chapter 4 of EPA's July 22, 2002, Permit Determinations Document. EPA provides a brief discussion here.

EPA must consider half a dozen factors when developing BAT standards, including the cost of achieving effluent reduction. CWA § 304(b)(2)(B), 33 U.S.C. §§ 1314(b)(2)(B)[7] and 1342(a(1)(B), 40 CFR § 125.3(d)(3). Notably, however, the CWA does **not** require any sort of comparison between, or balancing of, costs and benefits of BAT limits. See, e.g., *Reynolds Metals Co.* v. *U.S. EPA*, 760 F.2d 549, 565 (4th Cir. 1985)("as regards BAT. . . no balancing is required—only that costs be considered"). The statutory language is clear on this point. Congress only required EPA to "take into account" the costs associated with BAT. In contrast, Congress specified that development of best practicable control technology (BPT) standards must include a "consideration of the total cost of application of technology *in relation to* the effluent reduction benefits to be achieved from such application . . ." CWA § 304(b)(1)(B), 33 U.S.C. § 1314(b)(1)(B) (emphasis added). Based on the "conspicuous absence" of this sort of comparative language in the BAT provision, it is clear that "Congress did not intend the Agency . . . to engage in marginal cost-benefit comparisons." *Association of Pacific Fisheries* v. *EPA*, 615 F.2d 794, 818 (9th Cir. 1980); *accord EPA* v. *Nat'l Crushed Stone Ass'n*, 449 U.S. 64, 71 (1980)("in assessing BAT total cost is no longer to be considered in comparison to effluent reduction benefits"), *Texas Oil & Gas Ass'n* v. *U.S. EPA*, 161 F.3d 923, 936 (5th Cir. 1998) ("In applying the BAT standard, the EPA is not obligated to evaluate the reasonableness of the relationship between costs and benefits").

Thus, while cost-benefit balancing is not required, costs must be "considered" in setting BAT limits. Costs are not, however, to be a consideration of "primary importance" in setting BAT limits. See, e.g., *American Iron and Steel Inst.* v. *EPA*, 526 F.2d 1027, 1051-52 and n. 51 (3rd Cir. 1975)("it is clear that for [BAT] standards, cost was to be less important than for the [BPT] standards, and that for even [BPT] standards cost was not to be given primary importance"); *FMC Corp.* v. *Train*, 539 F.2d 973, 978-79 (4th Cir. 1976). The courts have also recognized that the cost of effluent reduction must be considered within the context of the CWA's basic goal of restoring and maintaining the chemical and biological integrity of the nation's waters. See 33 U.S.C. § 1251(a).

> The Act's overriding objective of eliminating ... the discharge of pollution into the waters of our Nation indicates that Congress, in its legislative wisdom, has determined that the many intangible benefits of clean water justify vesting [EPA] with broad discretion, just short of being arbitrary or capricious, in his consideration of the cost of pollution abatement.

FMC Corp. v. *Train*, 539 F.2d 973, 978-79 (4th Cir. 1976), as quoted in *Reynolds Metals Co.* v. *U.S. EPA*, 760 F.2d 549, 566 (4th Cir. 1985)(discussing BPT cost analysis). Furthermore, EPA must keep in mind the purpose of the BAT provision itself when assessing costs associated with BAT. "The BAT standard reflects the intention of Congress to use the latest scientific research and technology in setting effluent limits, pushing industries toward the goal of zero discharge as quickly as possible." *Kennecott* v.

[7] Specifically, the CWA § 304(b)(2)(B), 33 U.S.C. § 1314(b)(2)(B), requires that "[f]actors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate."

U.S. EPA, 780 F.2d 445, 448 (4th Cir. 1985), citing *A Legislative History of the Water Pollution Control Act Amendments of 1972*, 93d Cong., 1st Sess. (Comm. Print 1973), at 798.

Courts have made it clear that EPA has considerable discretion in how to consider and weigh costs. See, e.g., *Texas Oil & Gas Ass'n* v. *U.S. EPA*, 161 F.3d 923, 928 (5th Cir. 1998) (EPA has "considerable discretion in evaluating the relevant factors and determining the weight to be accorded to each in reaching its ultimate BAT determination.") With respect to factors that Congress only requires EPA to "consider," such as cost of the development of BAT standards, one court explained that

> Congress did not mandate any particular structure or weight for the many consideration factors. Rather, it left EPA with the discretion to decide how to account for the consideration factors, and how much weight to give each factor.

Weyerhaeuser Co. v. *Costle*, 590 F.2d 1011, 1045 (D.C. Cir. 1978). Thus, the permittee is incorrect to suggest that EPA must give particular emphasis to cost considerations in its assessment of BAT.

Of course, although EPA has "considerable discretion" in deciding the importance of cost in its ultimate BAT determination, most courts have also agreed that EPA must be reasonable in its consideration of costs. The legislative history of the CWA sets out this standard:

> While cost should be a factor in the Administrator's judgment, no balancing test will be required. The Administrator will be bound by a test of reasonableness. In this case, the reasonableness of what is 'economically achievable' should reflect an evaluation of what needs to be done to move toward the elimination of the discharge of pollutants and what is achievable through the application of available technology without regard to cost.

Congressional Research Service, A Legislative History of the Water Pollution Control Act Amendments of 1972 at 170 (1973), as quoted in *Association of Pacific Fisheries* v. *EPA*, 615 F.2d at 817.

EPA has clearly considered costs in a reasonable manner in this case. EPA evaluated the costs of different available technological options, and considered these costs in terms of what is "economically achievable" and the degree of progress each option could make toward the statutory goal of "the elimination of the discharge of pollutants" (in this case, heat).

While upholding the "reasonableness" standard for evaluating costs, courts generally have not defined the bounds of "reasonable" costs. At most, some courts have suggested that a BAT requirement that would result in "extremely costly more refined treatment" and only "a de minimis effect on the receiving waters" would be unreasonable. *Association of Pacific Fisheries* v. *EPA*, 615 F.2d 794, 818 (9th Cir. 1980). See also *Appalachian Power*, 545 F.2d at 1365 (suggesting that an environmentally inconsequential 10-Btu reduction costing $5 billion would not be reasonable, but that an additional 10 percent reduction in thermal pollution costing $3 billion could be "entirely reasonable" if it yielded sufficient environmental benefit). Short of such an extreme disparity in costs and environmental benefits, EPA has broad discretion to determine BAT and required reduction levels in light of the factors listed in § 304(b)(2)(B), including cost.

In the instant case, EPA has considered both the cost and the thermal effluent reduction capabilities of various technological options as well as the thermal effluent reductions they could achieve and the degree to which they would represent the BAT in terms of making progress toward eliminating the discharge of pollutants, as directed by Congress. EPA did not engage in a more detailed benefits assessment for the

BAT determination and none is required. However, in the context of its CWA § 316(a) analysis, EPA concluded that there were substantial and important environmental benefits to be obtained from the greater thermal reductions proposed by EPA as compared to the much smaller thermal discharge reductions proposed by the permittee. Therefore, even if such an analysis were needed, EPA's decision would be justified. EPA engaged in a detailed cost analysis of various alternatives and also considered the level of thermal discharge reduction that would be achieved by each technological option. In any case, the Final Permit's limits were not based on BAT; they were based on a § 316(a) variance.

While PG&E-NEG has suggested that *Appalachian Power* requires EPA to conduct a cost-benefit analysis, to the extent that *Appalachian Power* can be read to support an argument that a comparative cost/benefit analysis is required in setting BAT limits, the case is no longer good law. As discussed elsewhere in this response to comments, subsequent court decisions, including a decision by the United States Supreme Court, have made clear that comparative cost-benefit analysis is **not** required in setting BAT limits. See *EPA v. Nat'l Crushed Stone Ass'n*, 449 U.S. 64, 71-72 (1980),

10. Comment

PG&E-NEG stated that *Appalachian Power* is the "most relevant judicial interpretation of BAT specifically for thermal discharges from power plants," and that EPA Region 1 agrees that it "remains good law." PG&E-NEG stated that the analysis required under *Appalachian Power* is to compare the cost and ecological benefits of achieving a particular level of heat reduction with the costs and benefits associated with alternative levels of heat reduction.

Response

As stated above, EPA Region 1 does not agree that *Appalachian Power* is good law insofar as it suggests that costs and benefits must be compared to each other in developing BAT effluent limits. EPA has discussed the negative treatment of *Appalachian Power* by subsequent courts and EPA's interpretation of relevant portions of the case elsewhere in this response to comments.

11. Comment

PG&E-NEG stated that EPA Region 1 did not discuss the required cost-benefit analysis in the Permit Determinations Document even though both PG&E-NEG and EPA's consultant, Abt Associates, Inc., prepared cost-effectiveness analyses.

Response

As discussed above, the analysis suggested by the permittee is **not** required for a BAT determination. EPA provided the type of evaluation that is required.

12. Comment

PG&E-NEG stated that EPA Region 1's analysis shows that closed-cycle cooling costs 2100 percent more than PG&E-NEG's enhanced multi-mode technology per unit of reduction in flow and temperatures, and that EPA Region 1 should have considered this "gross disparity in the cost-effectiveness of the options."

Response

EPA does not agree that this type of analysis is required in developing the BAT limits in this case. The Agency also notes that the proposed metric ignores the substantially greater thermal discharge reduction achieved by the closed-cycle all units option versus the permittee's "enhanced multi-mode" proposal (94 percent vs. 33 percent). Moreover, the cost per unit of reduction in temperature and flow does not indicate the **environmental** effectiveness of the technology in its day-to-day operations. The entire point of setting BAT-based effluent limits is to require application of the best available technology economically achievable that will achieve reasonable further progress toward the national goal of eliminating the discharge of all pollutants. PG&E-NEG has not presented any evidence to indicate that cooling towers are not feasible or not economically achievable at BPS.

13. Comment
PG&E-NEG stated that a full-station retrofit with closed-cycle cooling has never been undertaken at a power plant the size and age of BPS that uses saltwater for cooling.

13.* A.** ***Comment. PG&E-NEG stated that EPA's conclusion that closed-cycle cooling is available for retrofitting at BPS, because such retrofitting has been done at five other power plants, is inadequate and misleading because EPA did not (1) gather any "detailed comparative information" about those plants, relying instead on brief summaries contained in the EPA Technical Permit Determinations Document for the proposed Phase II §316(b) rule, and telephone conversations by an EPA attorney with personnel at some of the plants; (2) analyze the specific configuration of any of those plants, or how the retrofits were accomplished, or at what cost; or (3) determine which of those plants was an appropriate model for BPS.

Response
EPA's research revealed that other large power plants have converted from open-cycle to closed-cycle cooling by retrofitting wet mechanical draft cooling towers to their formerly once-through cooling systems. These conversions represent the best performing facilities in terms of achieving thermal discharge (and intake flow) reductions at **existing** power plants. This technology is also widely in use at new power plants. The research that EPA has engaged in and the information it has provided is more than adequate for the purpose at hand. The permittee stated that EPA relied only on brief summaries from the CWA § 316(b) rulemaking process and conversations between an EPA attorney and power plant personnel. While such information would be sufficient if it provided the necessary information, the permittee's statements in this regard are incorrect. As the Administrative Record clearly reveals, EPA Region 1 conducted additional research beyond that suggested by the permittee. EPA further notes that the information on the successful retrofits did indicate why the retrofits were performed, how they were performed, and at what costs.

EPA believes that its findings regarding these other plants are adequate to demonstrate that retrofitting wet mechanical draft cooling towers to an existing power plant is generally feasible and that plants that have undertaken such conversions constitute the best performing facilities with respect to reducing thermal discharges. While the permittee pointed to alleged distinctions between BPS and the case study facilities, it is not necessary that the other facilities match the permittee's facility in every respect for BAT purposes. Different plants in an industry are necessarily distinct. Yet, the distinctions that the permittee pointed to regarding the plants that have undergone cooling tower retrofits do not suggest that comparison to BPS is incorrect or that the conversion could not be done at BPS.

EPA understands that for this case-by-case BPJ application of BAT, it must determine whether retrofitting cooling towers is feasible at BPS. EPA has concluded that it is. Moreover, BPS's own consultants submitted engineering and cost information to EPA that showed that retrofitting all four units at BPS with mechanical draft cooling towers was feasible at BPS. No comments have been received that establish otherwise.

EPA also notes that since issuance of the Draft Permit, EPA has learned of at least one other conversion of an open-cycle cooling system to a closed-cycle system as a result of retrofitting wet mechanical draft cooling towers to an existing fossil-fuel fired facility. The Yates Plant, owned by Georgia Power, began converting from once-through cooling to closed-cycle cooling in May 2001, and the conversion is expected to be completed in early 2004. Georgia Power also has plans to convert its McDonough Plant from once-through cooling to closed-cycle cooling using fiberglass mechanical draft cooling towers. In addition, EPA learned that a similar conversion is planned for the Wateree Station in South Carolina.

13. B. ***Comment.*** PG&E-NEG stated that each of the five plants can be distinguished from BPS.

i. Four of the five plants use freshwater, not saltwater.

Response
EPA believes this distinction is insignificant. Saltwater cooling towers are feasible, and one of these plants uses saltwater for cooling as BPS does. EPA's analysis for BPS takes into account the use of saltwater for cooling.

ii. Three of the plants were originally designed with the possibility of closed-cycle cooling in mind.

Response
The commenter did not make clear what having closed-cycle cooling "in mind" means with respect to the design and/or the conversion of a power plant cooling system from open-cycle to closed-cycle. The permittee also did not explain why this factor would create a significant distinction between the feasibility of converting cooling systems at these facilities as compared to doing so at BPS. EPA points out that even if three of the examples of existing plants that have retrofitted their cooling systems "had closed-cycle cooling in mind," not all of the retrofit plants did so. Moreover, EPA notes that at least one of the units at BPS was originally designed and operated with closed-cycle cooling (using a cooling canal rather than mechanical draft cooling towers), though it was later converted to open-cycle cooling.

iii. Of the remaining two plants, neither is one-third the size of BPS.

Response
The comment is misleading. Although BPS is a large generating facility, it is composed of four individual units totaling 1,600 megawatts (Unit 1 is 250 megawatts, Unit 2 is 250 megawatts, Unit 3 is 650 megawatts, and Unit 4 is 450 megawatts). The conversion of BPS will be broken down unit by unit, and therefore the total generating capacity of the facility is not determinative here. That is, the conversion of one unit is not dependent on the conversion of any other unit. The case studies provide information about converted units of similar size to some of BPS's units and in some cases are bigger than BPS's units. EPA recognizes that the number and capacity of the units will affect the magnitude of the cooling tower installation needed, which will have implications for space needs, cost, and environmental effects. These are site-specific considerations, however, that EPA has properly evaluated on a site-specific basis.

iv. The Army Corps paid for the retrofit at one of these plants, and another staged the retrofit over 20 years to spread out the costs.

Response
EPA believes that who paid for the retrofits is irrelevant. Although one of the retrofits might have been staged over 20 years, others have been considerably faster. EPA notes that BPS's schedule for retrofitting the station is staged over an approximately 4-year period.

v. The only plant in the same size range as BPS uses freshwater and "already had closed-cycle capability: it just added helper towers to a cooling pond system."

Response
The issues of size and salinity of the water are addressed above. EPA agrees that using helper towers is not the same as converting a plant's cooling system entirely to closed-cycle cooling but points out that the

use of helper towers demonstrates the feasibility of retrofitting an electric generating facility with a type of mechanical draft cooling towers for cooling purposes. Only one of the retrofit examples identified by EPA involved helper towers.

14. Comment
PG&E-NEG stated that EPA's analysis of capital costs is flawed.

14. A. ***Comment.*** PG&E-NEG stated that its consultants, Stone & Webster and Bechtel, estimated the total capital costs of converting BPS to closed-cycle cooling to be "on the order of $177 million."

Response
EPA has reviewed and considered the capital cost estimates and Draft Permit comments produced by Stone & Webster for the permittee. The permittee's other consultant, Bechtel, did not produce an independent capital cost estimate. Instead, it largely reviewed Stone & Webster's estimate and essentially concluded that it was reasonable. EPA has also reviewed and considered Bechtel's comments. In addition, EPA conducted independent capital cost estimates using two separate methods. EPA has discussed these estimates in detail elsewhere in this response to comments and will not repeat that discussion here. EPA will note here only that its cost estimates were lower than the permittee's estimates and that the Agency has concluded that its estimates are reasonable and appropriate.

14. B. ***Comment.*** PG&E-NEG stated that there is no dispute that it would incur other costs as well, including the cost of energy to run the additional fans and pumps needed, and the costs of lost energy production due to the inherently lower efficiency of closed-cycle cooling, construction outages, and the need to shut down BPS when fogging or icing is a possibility.

Response
EPA agrees that the use of cooling towers will result in some auxiliary energy and efficiency penalty costs. It also agrees that converting to closed-cycle cooling will result in costs to the permittee as a result of lost generation associated with unit outages during construction. EPA has accounted for these items in its cost estimates. At the same time, EPA notes that it concludes that these effects are not significant from a regional energy supply perspective. EPA also notes, and the permittee has agreed, that the permittee will gain some economic benefits from being able to generate **more** electricity during peak-demand, hot-weather periods as a result of using cooling towers. This benefit occurs because the facility will be able to meet its maximum temperature discharge limit without reducing generation as it now must do at times. This so-called "avoided load loss" benefit was also accounted for in the analyses of both EPA and the permittee. EPA concludes that this could offer an important marginal benefit to the regional energy supply during peak demand, hot-weather periods when the regional supply is most strained.

Finally, EPA does not agree that BPS will **have** to shut down generating units as a result of the risk of cooling tower fogging or icing. As discussed in detail elsewhere in this document, EPA believes the permittee has overstated the risk of this problem. Moreover, as is also discussed in detail elsewhere in this response to comments and in EPA's July 22, 2002, Permit Determinations Document, EPA believes there are several alternative methods that could be used, alone or in combination, to adequately deal with any threat from fog or ice and that would not require, or at least would greatly reduce, any generating unit shutdowns. Such methods evaluated by EPA include, for example, plume abatement cooling towers, enhanced traffic safety programs, and equipping cooling towers for occasional "bypassing." (EPA acknowledges that it has added a limitation precluding once-through cooling operations during the winter flounder spawning season (February through May), as discussed elsewhere, that will partially limit use of the authorized 122 hours per year of cooling tower "bypassing.") EPA also evaluated and developed costs for these approaches to managing any fog or ice issues, including the permittee's suggestion of unit shutdowns. Even including these costs, EPA's analysis shows that the costs of complying with the permit's limits will be affordable. Under CWA § 316(b), EPA also found that the costs of such compliance were not wholly disproportionate to its benefits.

14. C. ***Comment.*** PG&E-NEG stated that EPA's cost estimate fails to account for the fact that plumes from the 72-cell towers required for a full retrofit of BPS to closed-cycle cooling could cause fogging and icing, which would pose a safety hazard to nearby roads, including Interstate 195; that although EPA proposed a modification that would allow the retrofitted towers to operate in open-cycle mode, the "irrationally low heat limit" in the Draft Permit would limit implementation of this modification so that the towers could only operate in open-cycle mode for 122 hours per year, which is not enough to control the risk posed by fogging and icing; and that as a result, the proposed EPA retrofit will require either implementation of visible plume control (i.e., plume abatement), which would be at a cost that EPA estimated at more than $100 million, and which might be difficult or impossible to implement, or "frequent outages to avoid creating plumes when fogging and icing is a concern."

Response
EPA disagrees with these comments. The concerns expressed are responded to above and elsewhere in this response to comments. EPA adds here only that the thermal discharge limits suggested in the Agency's BAT review were clearly not "irrational;" they were properly based on BAT. Of course, the permit's thermal discharge limits were ultimately based on a CWA § 316(a) variance.

14. D. ***Comment.*** PG&E-NEG stated that Stone & Webster has long-time site-specific experience at BPS and based its estimates on a detailed conceptual design of the modifications that would be needed to convert BPS to closed-cycle cooling; and that after receipt of the Draft Permit, Bechtel's independent review of Stone & Webster's conclusions "verified Stone & Webster's overall cost and engineering approach," although it also "identified certain areas where Stone & Webster's estimates could be modified."

Response
EPA has discussed these issues in detail elsewhere in this response to comments. EPA only notes here its conclusion that Stone & Webster had provided a preliminary engineering design with an associated cost estimate, and that Bechtel confirmed that Stone & Webster had provided only an "order of magnitude" estimate with an error range of plus or minus 25 percent.

14. E. ***Comment.*** PG&E-NEG stated that EPA recognized that the costs estimated by BPS would make retrofitting the entire station to closed-cycle cooling economically unachievable and therefore sought an independent review of PG&E's estimates.

Response
PG&E-NEG suggests that EPA sought an independent review of BPS's experts' estimates because the Agency believed that these estimates demonstrated that a full-station retrofit could not be achieved economically. This claim is incorrect, unsupported, and unsupportable. EPA undertook the independent review as a matter of meeting its statutory responsibilities with reasonable and appropriate thoroughness. EPA's obligation to consider costs in developing BAT effluent limits includes independently assessing whether the costs asserted by the applicant are reasonable and appropriate figures to use in its evaluation. In this case, EPA's independent evaluation suggests that the permittee has overestimated the costs of complying with the proposed permit limits. See discussion of costs elsewhere in this response to comments and in § 4.4.3 of EPA's July 22, 2002, Permit Determinations Document. Moreover, even the costs estimated by the permittee appear to be economically achievable. The economic practicability of

permit compliance is discussed in more detail elsewhere in this response to comments. Finally, EPA independently analyzed both technological and economic achievability in order to obtain a comprehensive view of costs, engineering aspects, processes employed, and other factors EPA must consider under CWA § 304(b)(2)(B). Only by assessing these factors together could EPA determine whether the costs predicted for each BAT option were "reasonable."

14. F. ***Comment.*** PG&E-NEG stated that to review the cost estimates of BPS's experts, EPA hired a consultant, SAIC, that has never designed or constructed "even a single, simple electric generating station, never mind a full-station retrofit of the complexity and magnitude of the case at hand"; that SAIC's cost estimate is divorced from the site-specific realities at BPS; and that SAIC never visited BPS.

Response
These comments are addressed elsewhere in this response to comments. EPA only reiterates here that its consultant, SAIC, has suitable experience for the analysis conducted; that the cost estimates were, in fact, based on site-specific factors at BPS; and that SAIC did conduct a site visit to BPS as part of considering, and developing responses to, comments on the Draft Permit. Although the capital cost estimates went up somewhat due to certain changes in response to comments, the final estimates remain lower than the permittee's and EPA's BAT determination remains unchanged.

14. G. ***Comment.*** PG&E-NEG stated that EPA understates the capital costs of converting the entire station to closed-cycle cooling through "two different, but equally flawed" methods (i.e., the so-called "line-by-line method" and the "316(b) method").

Response
EPA disagrees with the comment that EPA's cost-estimating methods were flawed. This comment is addressed in detail elsewhere in this response to comments.

14. H. ***Comment.*** PG&E-NEG stated that SAIC used a generic construction cost database to estimate the capital costs of a full-station retrofit; that SAIC could not correlate most of the line items making up Stone & Webster's capital cost estimate with line items in the generic database because a full-station retrofit would be a highly specialized, unique project; that SAIC nonetheless assumed that the cost ratio for the matched line items would apply to the retrofit as a whole; and that this approach is fundamentally flawed because of SAIC's "inability to match the vast majority of tasks."

Response
EPA disagrees that the comments identify flaws in the "line-by-line method" analysis. EPA responds in detail to these comments elsewhere in this response to comments, including in memoranda prepared by the Agency's consultant, SAIC, which are incorporated herein by reference.

14. I. ***Comment.*** PG&E-NEG stated that EPA incorrectly asserts that "virtually all of the difference" between the Stone & Webster and SAIC capital cost estimates is due to two "errors": the use of an "inflated" labor rate and an "overestimate" of labor hours.

Response
EPA disagrees with this comment. What EPA actually said was that "most of the [capital cost] difference [between EPA's 'line-by-line method' estimate and the permittee's spreadsheet estimate] appears to be attributable to differences in labor rates and man hours." In any event, EPA conducted two separate, independent estimates using two different, reasonable approaches. EPA's two estimates came in close to each other, but both are significantly lower than the permittee's estimate. As discussed in detail elsewhere in this document, EPA concludes that its estimates are reasonable and appropriate.

14. J. ***Comment.*** PG&E-NEG stated that SAIC erroneously used the bare craft labor rate, while Stone & Webster used a labor rate that reflects the "fully burdened costs that BPS would need to pay (i.e., labor costs that include insurance, taxes, supervision, profit, and a host of other costs that a contractor will actually pass on to BPS)"; and that if SAIC's cost estimates properly reflected these "unavoidable and mandatory costs," its assumed labor rates would be similar to the rates used by Stone & Webster.

Response
This comment is responded to elsewhere in this response to comments. Although EPA has made some adjustments to the labor rates used in its analysis in response to this comment, the overall capital costs remain significantly lower than the Stone & Webster estimate and require no change in the BAT discharge limits.

14. K. ***Comment.*** PG&E-NEG stated that, according to Bechtel, even the labor rates projected by Stone & Webster are "on the low end of the achievable range."

Response
EPA disagrees. The labor rate issue is discussed in more detail elsewhere in this response to comments. EPA also notes that it learned during a site visit to BPS that the average labor rate in the current contract for the upcoming installation of air pollution control equipment at the power plant is approximately $75 per hour. See SAIC trip report in Appendices.

14. L. ***Comment.*** PG&E-NEG stated that SAIC misconstrued hourly labor rates by its incorrect use of the generic construction-cost database.

Response
Again, the labor rate issue is responded to in detail elsewhere in this response to comments.

14. M. ***Comment.*** PG&E-NEG stated that if SAIC were to correct these two errors, its analysis would show "virtually no difference" from Stone & Webster's capital cost estimate and would verify PG&E's original calculations.

Response
EPA disagrees. This comment is addressed in detail elsewhere in this response to comments.

14. N. ***Comment.*** PG&E-NEG stated that the § 316(b) Rule-Based Analysis presented in the Permit Determinations Document is flawed.

Response
EPA disagrees. Comments regarding application of the 316(b) method for estimating the costs of converting BPS's cooling system from open-cycle to closed-cycle cooling using cooling towers are responded to in detail elsewhere in this response to comments.

14. O. ***Comment.*** PG&E-NEG stated that SAIC used a costing method proposed by EPA Headquarters in its draft § 316(b) rule for existing facilities; and that this method has "systematic problems that render it useless as a tool to predict the specific costs of a full-station retrofit at BPS."

Response
First, as discussed in detail above, and in § 4.2 of EPA's July 22, 2002, Permit Determinations Document, the CWA gives EPA broad discretion in selecting analytical methods and, furthermore, does not require EPA to make a precise estimate of the costs of effluent reduction. Second, EPA ended up principally relying on the cost estimates from its line-by-line method for this Final Permit. The Agency did so to be

conservative because the line-by-line method estimate was somewhat higher than the § 316(b) method estimate, after improvements were made to the analyses in response to comments. That being said, however, the two estimates were still relatively close together. Third, EPA concludes that its use of the § 316(b) method in the context of this individual NPDES permit for developing BPJ limits was reasonable and appropriate. Moreover, use of the § 316(b) method in this context included certain adjustments thereto in order to more closely tailor it to the specifics of the BPS case. Comments concerning the § 316(b) method are discussed in detail elsewhere in this response to comments.

14. P. ***Comment.*** PG&E-NEG stated that in commenting on the draft § 316(b) rule for existing facilities, a significant number of commenters criticized this costing method, and that until EPA has considered these comments and determined whether to use the costing method, it is improper to rely on this method for making permit decisions.

Response
As discussed elsewhere in this response to comments, EPA does not believe it is required in this individual NPDES permit proceeding to respond to comments by the permittee (and others) submitted to EPA Headquarters on the Agency's proposed CWA § 316(b) Phase II regulations. This rulemaking effort by EPA is still in process. The Agency believes it is required to respond only to comments on the specific permit development at issue here. In any event, EPA has responded to comments on the § 316(b) method and its results elsewhere in this response to comments.

14. Q. ***Comment.*** PG&E-NEG stated that even if use of the draft 316(b) rule costing method were proper, the costing method was designed to estimate generic, nationwide aggregate costs, not plant-specific costs, as EPA Region 1 must do here.

Response
EPA concludes that its use of the § 316(b) method for this permit was reasonable and appropriate to meet its obligations under CWA §§ 301 and 304 in developing a BAT thermal effluent discharge limit. This comment is further responded to elsewhere in this response to comments.

14. R. ***Comment.*** PG&E-NEG stated that Stone & Webster's estimates show that the generic retrofit costs in this costing method significantly understate the actual capital costs for a full-station retrofit at BPS.

Response
EPA disagrees with this comment. First, EPA notes that the comment **assumes** that the Stone & Webster estimates are accurate. EPA disagrees with this assumption. Second, EPA believes that the § 316(b) method estimate is reasonable. It has discussed this method, and responded to comments about it, in detail elsewhere in this response to comments. Third, EPA's separate and independent line-by-line method analysis produced an estimate relatively close to the § 316(b) method analysis. These results tend to support the reasonableness of these two estimates. Finally, as discussed in detail elsewhere in this response to comments, other information also supports the reasonableness of the EPA estimates and the likely overestimation of the permittee's estimates (e.g., fewer cooling tower cells likely needed, likely overstatement of vapor plume issues).

14. S. ***Comment.*** PG&E-NEG stated that the capital cost estimate SAIC derived using the draft § 316(b) rule costing method is different from EPA Headquarters' conclusion, presented in documents supporting the draft § 316(b) rule, that "capital costs for individual high-flow plants to convert to wet towers generally ranged from $130 to $200 million dollars, with annual operating costs in the range of 4 to 20 million dollars"; and that the Administrative Record for the Draft Permit does not explain the inconsistency between the EPA Headquarters cost range (which includes Stone &

Webster's $177 million estimate) and SAIC's $81 million estimate. PG&E-NEG also states that the costs estimated by Stone & Webster are consistent with EPA Headquarters' conclusion.

Response
EPA disagrees with this comment. EPA Region 1's estimate for BPS using the § 316(b) method is, in fact, consistent with the general estimates for different sized plants that EPA Headquarters produced for the CWA § 316(b) rulemaking using the § 316(b) method. The permittee has misinterpreted the information from the CWA § 316(b) rulemaking record. This comment is addressed in more detail elsewhere in this response to comments.

14. T. ***Comment.*** PG&E-NEG stated that EPA Region 1's analysis also contains the following errors: (1) it improperly and arbitrarily applied a 6 percent "economy of scale" factor, (2) it arbitrarily shortened unit outage times, (3) it arbitrarily assumed all unit outages would occur in the last year of construction, and (4) it irrationally assumed that the contractor would wait until the end of the multiyear construction contract to begin getting paid.

Response
EPA disagrees with these comments suggesting that EPA's cost-estimation efforts were arbitrary or irrational for the stated reasons. Nevertheless, in some cases, EPA made adjustments to its analysis in response to these comments. For example, whereas the permittee had unreasonably assumed that it would pay the full costs of the construction project at the beginning of the project, EPA adopted an alternative approach of assuming the costs would be paid at the end of the project. In response to the permittee's comment, EPA has concluded that a more reasonable, realistic approach would be that the permittee would pay portions of the costs at the beginning, during, and at the end of the construction. Therefore, EPA has adopted a payment schedule extending over the life of the project. EPA has addressed this issue, and all the other comments noted above, in detail elsewhere in this response to comments.

14. U. ***Comment.*** PG&E-NEG stated that all of these errors have a profound effect on EPA's estimates of the capital costs of a full-station retrofit; and that if EPA Region 1 were to correct these errors, its estimate of the present value cost over the life of that technology would increase by $119 million, or 143 percent.

Response
EPA disagrees with this comment and has responded to comments regarding the Agency's cost estimates in detail elsewhere in this response to comments.

15. Comment
PG&E-NEG stated that EPA's consultant, Abt Associates, Inc., which used SAIC's capital cost estimates as part of the basis for a financial cost analysis similar to the financial cost analysis performed by its own consultant Robert Stavins, contained errors in addition to SAIC's errors that further distort EPA's estimates of the costs of a full-station retrofit to closed-cycle cooling.

Response
EPA disagrees with this general comment. EPA has responded to the permittee's detailed comments regarding the overall financial cost analysis prepared for EPA by Abt Associates, Inc., elsewhere in this response to comments. EPA/Abt did make some adjustments to its analysis—just as the permittee made some adjustments to its own analysis in response to points noted in the EPA/Abt analysis for the Draft Permit. But EPA's estimates remain lower than the permittee's, and EPA concludes that the analyses are reasonable and appropriate for use in this permit analysis.

15. A. ***Comment.*** PG&E-NEG stated that the most significant of Abt's errors was its use of an unrealistic estimate of the rate at which BPS could borrow money to finance this type of capital project and thereby "completely ignoring the current financial position of the electric generation industry as a whole and the specific financial circumstances of BPS's owner," both of which affect the interest rates available to BPS's owner.

Response
EPA disagrees with this comment. EPA believes that the discount rate used in Abt's analysis was reasonable and appropriate and that sound support for the figure was provided. That being said, Abt conducted a new analysis in response to comments, to take into account changed economic conditions since the first analysis, that could influence the cost of capital to the permittee and other firms operating in the merchant power industry. As a result of this updated analysis, Abt has conservatively adjusted the discount rate upward, but still to a level less than the discount rate(s) posited by the permittee. EPA believes the discount rate used by Abt is reasonable and appropriate for use in this permit development. The discount rate issue is discussed in greater detail elsewhere in these comments, including in memoranda by Abt Associates, Inc., which are incorporated by reference herein.

15. B. ***Comment.*** PG&E-NEG stated that Abt also made other errors, including "significantly overstating one of the financial benefits of the cooling technologies—the ability to generate electricity when warm water temperatures currently require curtailment—by assuming an unreasonably high price for the power that could be sold."

Response
EPA disagrees that Abt made "other errors" that render its cost estimates unreasonable. EPA disagrees with the specific suggestion that Abt "significantly overstated" the financial benefit that would be provided to the permittee as a result of cooling towers enabling **more** electricity to be generated during peak demand, hot weather periods. EPA believes Abt's analysis is reasonable and adequately explained, including the basis for its estimate of the prices for the additional power to be sold. This issue is discussed in more detail elsewhere in this response to comments, including memoranda by Abt that are incorporated herein by reference.

15. C. ***Comment.*** PG&E-NEG stated that given EPA's failure to take the specific circumstances at BPS into account, as is required by EPA regulations, in developing its cost estimates, EPA has failed to provide a credible response to the detailed, site-specific information in BPS's permit application; and that EPA's cost estimates, which are about 75 percent lower than BPS's estimates, do not represent the "actual cost" of the full-station retrofit to closed-cycle cooling that the Draft Permit requires.

Response
EPA disagrees that it has failed to consider the specific circumstances at BPS to the extent required by the CWA. EPA also disagrees that it must come up with a precise "actual" cost prediction for the implementation of the closed-cycle BAT standard. EPA is required only to establish a reasonable estimate within the context of "considering costs" under the BAT standard and has done so. While it is necessary to consider site-specific issues in developing a reasonable cost estimate for a case-by-case BPJ limit, as EPA has done, there is nothing that requires a more **precise** estimate for a site-specific BAT limit than for a national BAT effluent guideline. The BAT standard is the same in either case. EPA also notes, as discussed elsewhere herein, that the permittee also did not develop "actual" costs, but rather only an order-of-magnitude estimate of costs that according to its terms has a range of error of approximately plus or minus 25 percent. Comments addressing the details of EPA's cost estimates are addressed in detail elsewhere in this response to comments.

16. Comment
PG&E-NEG stated that EPA Region 1's evaluation of the environmental, aesthetic, and safety impacts of a full-station retrofit to closed-cycle cooling is based on speculation and uninformed personal observations.

Response
EPA disagrees. The Agency's analysis was based on factual research, empirical observation, and appropriate analysis. The Agency has also augmented its work on these topics in response to comments. These issues and this comment are responded to in detail elsewhere in this response to comments.

16. A. ***Comment.*** PG&E-NEG stated that analyses by Stone & Webster and TRC Environmental indicate that retrofitting the entire BPS station to closed-cycle cooling by installing a 72-cell cooling tower array would create noise, visual, plume, and safety impacts that "could prove expensive to mitigate"; and that EPA did not independently evaluate these impacts or make any attempt to quantify likely high costs of mitigating them.

Response
EPA disagrees with this comment. For the Draft Permit, EPA did consider all these issues and evaluated them independently, as well as by considering material submitted by the permittee. Indeed, EPA's analysis for some of these issues was more detailed than that provided by the permittee. EPA's analysis also considered methods and costs for mitigating these concerns, if necessary or desirable (e.g., the water vapor plume issue). In response to comments, EPA's analysis for the Final Permit includes additional analyses of these issues (e.g., vapor plume, noise), including the costs of mitigation. EPA's assessment of these issues, and potential related costs, is more than reasonable and certainly satisfies the BAT-related provisions of CWA §§ 301 and 304. These issues are discussed in detail elsewhere in this response to comments. EPA also notes that information provided by the permittee to support its comments on some of these issues was unclear or lacked adequate documentation to explain or justify the conclusions presented.

16. B. ***Comment.*** PG&E-NEG stated that noise would be a significant problem because cooling towers operate 24 hours a day, including at night when ambient noise is low.

Response
EPA has responded to the comments concerning noise by the permittee (and others) elsewhere in this response to comments. The Agency only reiterates here that it concludes that noise can be adequately managed at BPS and any mitigation requirements will be determined in the state permitting process.

16. C. ***Comment.*** PG&E-NEG stated that BPS's design already assumes the use of the low-noise fans that EPA has suggested.

Response
Unfortunately, it is unclear from the conflicting information submitted by the permittee what sort of low-noise fans or other noise mitigation it included in its design. To the extent that this comment is true, EPA has also considered the costs of such low-noise fans because since SAIC's cost estimates for EPA adopted the Stone & Webster capital cost estimate for cooling tower equipment. In any event, EPA has further investigated noise mitigation, including low noise fans **and** other measures, and has considered the costs of such measures in its evaluation. The issues of noise, noise mitigation, and related costs are addressed elsewhere in the response to comments.

16. D. ***Comment.*** PG&E-NEG stated that physical constraints at the site preclude following EPA's suggestion that cooling towers be moved farther from sensitive receptors.

Response
EPA remains unconvinced that some or all of the cooling towers could not be relocated at the site, essentially for the reasons discussed in EPA's July 22, 2002, Permit Determinations Document. Nevertheless, EPA's conclusion that noise or other issues can be suitably managed is not based on moving the cooling towers to another part of the site. EPA expects that the permittee will, however, consider available areas across the entire site as it develops its optimal approach to permit compliance at BPS. EPA acknowledges the fact that space is needed at the site for new air emissions control equipment. Moreover, it also points out that **since** issuance of the Draft Permit, a new proposal recently emerged involving the potential location of a liquid natural gas terminal on a southern portion of the BPS site.

16. E. ***Comment.*** PG&E-NEG stated that EPA Region 1's conclusion that visible vapor plumes would not present an aesthetic problem is unfounded and incorrect. BPS consultant EarthTech's plume modeling indicates that a 20-cell tower would produce a visible plume of greater than 1,000 meters for almost 3,000 hours per year, and that the visible plumes from a 72-cell tower would be much larger.

Response
EPA has considered the permittee's comment but finds that the company submitted little analytical information to justify or indicate how it reached its specific conclusions regarding the visible plume issue. EPA also notes that it does not believe a water vapor plume should provide a major aesthetic problem when considered relative to the existing aesthetic environment at the site, including its existing plumes from facility air emissions. This is further discussed in Chapters 4 and 7 of EPA's July 22, 2002, Permit Determinations Document. EPA has also explained, as discussed elsewhere herein, that its analysis leads to the conclusion that the permittee has overstated the vapor plume issue and the number of cooling tower cells that would be needed at the plant. Finally, EPA also points out that it has evaluated cooling towers with plume-abatement technology and concluded that this technology is feasible and affordable for retrofitting at BPS. Therefore, if the visible plume(s) is a major aesthetic concern to the permittee, it could use plume-abatement technology for all or some of its cooling towers to mitigate the issue. The vapor plume is discussed in more detail elsewhere in this response to comments.

16. F. ***Comment.*** PG&E-NEG stated that EPA Region 1's conclusion that a full-station retrofit to closed-cycle cooling will not affect traffic safety lacks any reasonable basis, and that EPA Region 1 has not justified the "various 'solutions' it offers as effective or economically reasonable."

Response
EPA disagrees with this comment. EPA provided a reasonable basis for its conclusions on this issue in EPA's July 22, 2002, Permit Determinations Document. It also explained why the suggested approaches would be both effective and economically reasonable. EPA has also conducted additional analyses on this issue in response to comments and continues to conclude that there are several possible ways to effectively manage any vapor plume-related traffic safety issues that the permittee concludes might be present. These types of issues have been appropriately managed at many cooling tower installations and can be managed at BPS as well. In addition, EPA concludes from its analysis that the permittee overstates the extent of any vapor plume issue. These issues are addressed in more detail elsewhere in this response to comments.

16. G. ***Comment.*** PG&E-NEG stated that EPA Region 1's principal "solution" of installing technology that would allow for the cooling towers to be bypassed has a high cost and might not be feasible at all; and that, regardless, the Draft Permit's low thermal discharge limits would not allow for open-cycle operation enough to mitigate the fogging and icing that would occur.

Response
EPA disagrees and has responded to all aspects of this comment elsewhere in this response to comments. EPA also notes that the permittee has not provided comments demonstrating that the bypass approach would be infeasible. EPA also notes, however, that it has limited the use of any once-through cooling operations during the winter flounder spawning season (February through May), so that cooling tower bypassing would not be an option at that time. It also points out that these issues can also be eliminated by using hybrid cooling towers.

16. H. ***Comment.*** PG&E-NEG stated that while EPA Region 1 has suggested an "early warning system," the Massachusetts Highway Department is unconvinced that such a system would work, and notes that sensors installed in the Braga Bridge quickly became nonfunctional and have remained so for at least a decade.

Response
EPA continues to believe that some traffic control measures (such as salting and sanding) could adequately address safety hazards, and that the Massachusetts Highway Department did not indicate that such an approach would not work. Moreover, EPA also notes that while the "sensors" became nonfunctional, this was not cited as causing a safety problem despite fog in the area.

17. Comment
PG&E-NEG stated that EPA's statement on page 4-3 of the Permit Determinations Document that BAT limits require "reasonable further progress towards the national goal of eliminating the discharge of all pollutants" is a misstatement of the law because the enactment of CWA § 316(a) made it clear that thermal dischargers were not required to meet the "elimination" standard but only to ensure that fish, shellfish, and wildlife were protected.

Response
EPA disagrees. The Agency has properly stated the law with respect to BAT standards. It disagrees that CWA § 316(a) necessarily supplants BAT and water quality standards for regulating thermal discharges in all cases. CWA § 316(a) is a variance provision and where the variance standard is not met, then the otherwise applicable BAT based and water quality-based limitations apply. See 1972 Leg. Hist. at 175 (Report of the Conference Committee on the Clean Water Act of 1972) ("thermal pollutants will be regulated as any other pollutant *unless* an owner or operator can prove that a modified thermal limit can be applied which will assure 'protection and propagation' of ... [the BIP]" (emphasis added)). These BAT standards are as EPA described them, and they do not incorporate a test of what is adequate to assure the protection and propagation of the balanced, indigenous population of fish, shellfish, and wildlife in and on the receiving water. That is the standard for a § 316(a) variance, and it neither applies in the context of developing BAT limits nor replaces the goal of BAT. Rather, § 316(a) authorizes EPA to waive BAT (and water quality-based) limits for thermal discharges if the owner or operator of the facility "demonstrate[s] to the satisfaction of the Administrator . . . that any effluent limitation proposed for the control of the thermal component of any discharge from such source will require effluent limitations more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made . . ." CWA § 316(a), 33 U.S.C. § 1326(a).

The *Appalachian Power* court directly addressed the standard that thermal dischargers must meet under the CWA. The court held that EPA was "under a statutory duty to determine whether, in fact, its [thermal effluent] regulations for 1983 will 'result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants . . .'" *Appalachian Power*, 545 F.2d at 1361, quoting 33 U.S.C. § 1311(b)(2)(A). It also expressly indicated that EPA should not rely solely on § 316(a) in assessing the appropriateness of new discharge limits because "doing so would effectively preempt consideration of the statutory factors set forth in §§ 304(b)(2) and 306 for [BAT].” *Id.* at 1369 n.46. EPA agrees that Congress did not intend the § 316(a) variance analysis to replace consideration of the factors or the overall goal of the BAT provision in the context of the development of BAT limits.

Having said this, EPA must also point out that the permit is now issuing is, in fact, based on a CWA § 316(a) variance and, thus, **is** based on the BIP standard.

18. Comment
PG&E-NEG stated that EPA’s statement on page 4-3 of the Permit Determinations Document, that “there are no ELGs for thermal discharges from facilities in a steam electric power generating point source category,” is incomplete and misleading because although there are currently no ELGs, EPA did promulgate such regulations in 1974, and under those regulations, BAT for Units 1, 2, and 3 of BPS was determined to be open-cycle cooling.

Response
EPA disagrees. Indeed, to say otherwise would be misleading. Currently, there are **no** effluent guidelines governing thermal discharges from steam electric power plants. The 1974 regulations were remanded to EPA in 1976 and have not been repromulgated. The permittee’s arguments about what those regulations **would have** required are irrelevant to the present permit determination. That being said, EPA also notes its conclusion that the permittee’s interpretation of the proposed effluent guidelines and how they would have been intended to apply to BPS is overly simplistic. First, it is clear that the proposed regulations would have required closed-cycle cooling for Unit 4, and BPS never previously agreed it was bound by the regulation to install closed-cycle cooling for Unit 4. Second, it was clear that these regulations did not intend to authorize open-cycle cooling at plants that would be discharging heat even beyond the year 2000. EPA expressly based its proposed approach on the expectation that plants commencing operations before 1970 would have shut down by 2000. BPS is expected to run at least another 20 years from the present date. Therefore, the proposed regulations would not have intended to allow Units 1, 2, and 3 to use open-cycle cooling as BAT. This issue is discussed in greater detail further above. In any event, these regulations have not been in effect for approximately 25 years. Therefore, BAT limits for this case are determined based on a case-by-case application of the BAT criteria in light of **current** facts, not proposals from 25 years ago.

19. Comment
PG&E-NEG stated that, despite EPA’s statement on page 4-8 of the Permit Determinations Document that its regulations require it to consider “both the appropriate technology for the category of point sources of which the applicant is a member based on all available information and any unique factors relating to the applicant,” EPA never in fact considers the appropriate technology for the category of point sources of which BPS is a member, and that the reason for this is that EPA’s consistent practice confirms that open-cycle cooling is BAT for existing facilities like BPS.

Response
EPA disagrees with these comments and has addressed these issues above.

20. Comment
PG&E-NEG stated that on Page 4-16 of the Permit Determinations Document, EPA acknowledges that *Appalachian Power* requires EPA to consider the costs of a particular technology in light of effluent reduction benefits.

Response
EPA disagrees. Although EPA forthrightly identified the ruling of the court in *Appalachian Power*, it clearly did not endorse the court’s conclusion on the consideration of costs and benefits. As explained

above, since the *Appalachian Power* decision, the Supreme Court and many other federal courts have held that comparison of costs and benefits is not part of the analysis for developing BAT standards. This is further discussed above.

21. Comment
PG&E-NEG stated that in concluding that no cost-benefit analysis is needed for developing BAT standards for the BPS permit, EPA ignores the fact that *Appalachian Power* is the only on-point case applying BAT and instead relies entirely on cases involving other industries and types of discharges.

Response
EPA disagrees with the permittee's legal analysis here. The cases EPA cites are directly on point. The issue here is what factors must be considered in developing BAT limits under the CWA. The basic technology standard requirements do not vary on an industry-by-industry basis. EPA's legal analysis on this point is sound.

22. Comment
PG&E-NEG stated that EPA has failed to discuss the cost-effectiveness analysis that *Appalachian Power* requires, that EPA's consultant performed such an analysis, and that EPA has ignored BPS's analysis.

Response
EPA's consideration of costs was reasonable and consistent with CWA requirements for BAT analysis. EPA compared the costs of different options and compared the different levels of thermal discharge reduction that they could achieve. There is no requirement to do the cost-effectiveness analysis urged by the permittee. EPA did, however, review and consider the "cost-effectiveness" analysis provided by the permittee. EPA notes that the permittee's analysis is problematic for a number of reasons. First, the metrics provided completely ignore the environmental ramifications of the different levels of thermal discharge (and flow) reductions. EPA believes these ramifications are significant, as discussed elsewhere in this document and in the July 22, 2002, Permit Determinations Document. Therefore, these values are not meaningful. Second, EPA believes the permittee's cost estimates substantially overstate the cost of options. Finally, EPA notes that the *Appalachian Power* decision did not require a cost-effectiveness analysis.

23. Comment
PG&E-NEG stated that EPA ignores numerous cases confirming that EPA's decisions cannot be based on speculation and requiring that EPA use sound science as the basis for its conclusions (citing *Appalachian Power Co.* v. *EPA*, 251 F.3d 1026 (D.C. Cir. 2001) and *Chemical Manufacturers Association* v. *EPA*, 28 F.3d 1259 (D.C. Cir. 1994)).

Response
EPA disagrees. Its decision is based on sound science and is consistent with applicable legal standards. EPA also notes that the permittee's bare assertion that the Agency has ignored the case law does not raise a genuine issue that requires the Agency's response. "Assertions that the limitations are 'not based upon substantial evidence' and 'not supported by accurate data and analysis and sound scientific principles,' without elaboration or discussion of the information in the record which is pertinent to each limitation, cannot be considered." *U.S. Steel Corp.* v. *U.S. EPA*, 556 F.2d 822, 839 (7th Cir. 1977) (holding that unsubstantiated and conclusory comments regarding an NPDES permit for wastewater discharge, such as the bare assertion that "the limitations for chloride, sulfate and fluoride were based on an erroneous interpretation of the Combinatorics study," did not effectively raise the issue). See also *Chemical Mfrs. Ass'n* v. *U.S. EPA*, 870 F.2d 177, 228 (5th Cir. 1989) (rejecting industry claim that data EPA relied on to determine BAT were unrepresentative and holding that the industry must not simply claim sampling was unrepresentative or inadequate, but must explain why it is unrepresentative or inadequate).

As is explained elsewhere in this document, "[a]gency determinations based on highly complex and technical matters are 'entitled to great deference.'" *Appalachian Power Co.* v. *EPA*, 251 F.3d 1026, 1035 (D.C. Cir. 2001), quoting *Appalachian Power Co.* v. *EPA*, 249 F.3d 1032, 1051-52, quoting *Public Citizen Health Research Group* v. *Brock*, 823 F.2d 626, 628 (D.C. Cir. 1987). See also, *Reynolds Metals Co.* v. *U.S. EPA*, 760 F.2d 549, 559 (4th Cir. 1985) ("an agency's data selection and choice of statistical methods are entitled to great deference ... and its conclusions with respect to data and analysis need only fall within 'zone of reasonableness'") (internal citations omitted). EPA retains discretion to choose the method of analysis it deems appropriate, so long as that method was not chosen arbitrarily or solely for the purpose of achieving a predetermined outcome. See, e.g., *Chemical Mfrs. Ass'n* v. *U.S. EPA*, 870 F.2d 177, 228 (5th Cir. 1989)(holding that EPA's use of weighted averaging to determine long-term averages of toxics discharged by a plant using BAT was not an abuse of discretion, in part because weighted averaging is a recognized statistical method for adjusting a data set when each unit is not represented by a comparable number of samples).

Although courts give a great deal of deference to agency determinations concerning complex technical matters, that deference has its bounds. The two cases that PG&E-NEG cites in its comment demonstrate the extreme circumstances in which a court will strike down an agency's scientific determinations. For example, the D.C. Circuit Court overturned EPA's use of a generic air dispersion model to determine whether methylene diphenyl diisocyanate (MDI) was a high-risk pollutant because it found "no rational relationship between the model and the known behavior of the hazardous air pollutant to which it is applied." *Chemical Manufacturers Association* v. *EPA*, 28 F.3d 1259, 1265 (D.C. Cir. 1994). The court held that the use of a generic model for this purpose was perfectly acceptable, "even when faced with data indicating that it is not a perfect fit." *Id.* However, the model used in this case assumed that the pollutant would be a gas at 20 °C from a single 10-meter stack and would disperse as a gas through the atmosphere. MDI, however, was a solid at 20 °C, entered the atmosphere from many sources throughout a facility, tended not to evaporate, and dispersed as an aerosol. The court found that this complete lack of relationship between the model assumptions and the substance being modeled, together with EPA's failure to explain why it nonetheless chose this model, was arbitrary and capricious. *Id.* at 1264-65.

The second case cited by PG&E, *Appalachian Power Co.* v. *EPA*, 251 F.3d 1026 (D.C. Cir. 2001), involved a challenge to an EPA CAA rule requiring up-wind states to revise their State Implementation Plans to impose additional controls on nitrogen oxide emissions. These limits were derived by applying "growth factors" reflecting growth projections to emission inventory data. *Appalachian Power,* 251 F.3d at 1031. The court agreed with petitioners that EPA's reliance on the growth factors was arbitrary in that EPA had not explained the plain disparity between its model projections and "real world observations." *Id.* at 1035. Notably, the court did not disapprove EPA's reliance on the growth factors themselves, but remanded the regulations so that EPA could explain its choice. *Id.*

In contrast to the facts of these cases, EPA has carefully considered and explained its scientific analyses, ensuring that the methods are reasonable and appropriate for the circumstances. These technical issues are discussed elsewhere in this document and in EPA's July 22, 2002, Permit Determinations Document.

24. Comment

PG&E-NEG stated that on Page 4-36 of the Permit Determinations Document, EPA acknowledges that lack of a track record is reason to deny a particular technology, such as dry cooling, as BAT; and that despite this acknowledgment, EPA ignores this requirement when determining that closed-cycle cooling is BAT for BPS.

Response

EPA does acknowledge that lack of a track record for use of a technology is a reason to be cautious about finding that technology to be "available." However, EPA also notes that this, by itself, is not determinative. EPA did not state and does not agree that the absence of a track record for a particular technology is necessarily reason to reject it as BAT. In fact, the legislative history and case law regarding BAT support the selection of technologies based on pilot studies or other research, even if they have not yet been implemented at a full-scale facility. This legal issue is discussed in § 4.2.3a of EPA's July 22, 2002, Permit Determinations Document. This makes sense because the BAT provision is designed to force technological developments that will accomplish the CWA's goal of eliminating the discharge of pollutants as quickly as possible. To deny a technology simply because it has not been used extensively would run counter to the purpose of the BAT standard. With respect to dry cooling, EPA did conclude that it was not clear that retrofitting this technology at BPS would be technologically feasible. In other words, EPA could not conclude that the technology was available. An important part of that conclusion was the fact that EPA has not identified a single power plant that has retrofitted its cooling system from open-cycle to closed-cycle using dry cooling. Dry cooling also would require significantly more space and raises more significant energy penalties. By contrast, EPA did find several suitable examples of existing electric power plants converting from open-cycle to closed-cycle cooling using wet mechanical-draft cooling towers. These examples support EPA's conclusion that this technology constitutes BAT for BPS. This issue is discussed in more detail above.

25. Comment
PG&E-NEG stated that on pages 4-62 through 4-94 of the Permit Determinations Document, EPA has not accurately described the technological and process requirements that would be necessary to retrofit closed-cycle cooling at BPS.

Response
EPA believes it has properly evaluated the technological and process requirements that are necessary to retrofit BPS to closed-cycle cooling and has responded to specific issues raised by the permittee's consultants (Stone & Webster and Bechtel) elsewhere in this response to comments.

26. Comment
The permittee cited to comments by its consultants and states that EPA's engineering cost analyses contain numerous errors and produce estimates of the cost of retrofitting that are too low, and that these errors are compounded by economically unreasonable assumptions in the financial cost analysis.

Response
EPA disagrees with this comment. This comment is responded to elsewhere in this response to comments.

27. Comment
The permittee stated that on page 4-64 of the Permit Determinations Document, EPA asserts that BPS failed to take into account a 6 percent "economy of scale" factor for a full-station retrofit to closed-cycle cooling. The permittee states that economies of scale would not be realized because of the "nature of the work," the complexity of the construction project, and the limited laydown space available. The permittee also asserts that due to the facility changes that will be required, it would be necessary to shut down BPS for much greater periods of time than EPA predicts to allow any economies of scale. In addition, according to the permittee, to the extent that EPA relies on the generic methodology in the proposed Phase II Existing Facility rule as justification, that methodology is highly controversial, and that, in any event, generic methodology has no application when a specific engineering design has been presented that demonstrates why the savings will not be realized.

Response
EPA has addressed this comment elsewhere in this response to comments. The bottom-line answer is that EPA and SAIC decided not to determine any economy of scale value for a full-station cooling tower retrofit. EPA took this approach as a conservative response to the permittee's comments, although the

Agency continues to believe that it would be reasonable to assume that some savings related to economies of scale could be realized for the entire station closed-cycle option rather than merely combining all the individual costs for retrofitting each separate unit.

28. Comment
PG&E-NEG stated that SAIC is not in the business of designing or constructing power plants and therefore is not an expert in the matters on which it opined; that its analysis is inherently flawed and not probative of the actual costs that would be incurred for the construction of any of the modeled options; and that it has significantly underestimated the capital costs associated with either option.

Response
EPA disagrees. SAIC is appropriately qualified to provide the estimates it has developed, and it has developed reasonable and appropriate analyses for EPA. This comment is responded to in more detail elsewhere in this response to comments.

29. Comment
PG&E-NEG stated that BPS's original estimates prepared by Stone & Webster are appropriate and accurate, and that it contracted for a separate review by Bechtel that was initiated after EPA's issuance of the Permit Determinations Document. The permittee states that its consultant Bechtel's analysis supports the conclusions of its consultant Stone & Webster, and that this material indicates that SAIC has significantly underestimated the capital costs associated with either option.

Response
EPA disagrees that SAIC has significantly underestimated the capital costs associated with the cooling tower options at hand. This comment is responded to in detail elsewhere in this response to comments.

30. Comment
PG&E-NEG stated that the conclusions from EPA's "Independent Line Item Analysis" are of no probative value because they resulted from incorrect inputs into a flawed methodology; that SAIC used demonstrably low labor rates (which failed to consider such costs as insurance, taxes, profit, and other items that BPS would be required to pay) and underestimated man-hours as a result of improper use of the generic Means database; and that when the labor rates and required labor hours are corrected to reflect actual conditions, SAIC's estimates correspond closely to BPS's.

Response
EPA disagrees that if "correct" values were used in SAIC's analysis, the cost estimates would correspond closely to BPS's own estimate. SAIC has revised certain values in response to the permittee's comments. With these revised values, SAIC's estimate under this method has gone up somewhat. This estimate remains, however, significantly lower than the permittee's estimate. EPA believes SAIC's estimate is reasonable and appropriate and that the permittee's value represents an overestimate. These issues are addressed in more detail elsewhere in this response to comments.

31. Comment
PG&E-NEG stated that SAIC's methodology for the "Independent Line Item Analysis" is flawed because it presumes that matching a small percentage of costs against a generic database and then scaling the costs up to the whole is a legitimate means of estimating costs, and that this presumption is rebutted by its consultants Stone & Webster and Bechtel.

Response
EPA disagrees that the permittee's analyses "rebut" the cost-estimation method used by SAIC. This comment is responded to in more detail elsewhere in this response to comments.

32. Comment
PG&E-NEG stated that SAIC improperly relied on the costing methodology from the EPA § 316(b) Phase II Proposal for Existing Facilities (August 7, 2002) to derive its second capital cost estimate; that this costing methodology received significant criticism; that this methodology's use of generic and arbitrary "retrofit" costs and addition to account for salt water conditions is inappropriate for estimating specific costs for specific projects; and that Stone & Webster's estimates of cooling tower costs alone are roughly comparable to the estimates obtained in the § 316(b) methodology, but Stone & Webster's engineering estimate of add-on costs exceed the generic EPA values by more than a factor of 4.

Response
EPA does not agree that the estimates generated using the "316(b) method" were unreasonable or inappropriate in the context of developing the proposed BAT limits. The method was not entirely "generic" and certainly was not "arbitrary" because the analysis was based on general analysis augmented with certain factors to reflect the situation at BPS (e.g., costs for salt water cooling towers). EPA has made some revisions to the § 316(b) method in response to comments received. But, ultimately, all of this has become immaterial because EPA based its detailed cost estimates for the Final Permit on the estimates generated by its alternative, independent estimation method (the "line-by-line method"). EPA has used the figures from the line-by-line method because the estimates from that method were somewhat higher than, although close to, the § 316(b) method values. EPA used the higher values to produce a more conservative estimate. EPA has addressed the permittee's comments regarding the estimates generated using the "316(b) method" in detail elsewhere in this response to comments.

33. Comment
PG&E-NEG stated that EPA asserts on page 4-71 of the July 22, 2002, Permit Determinations Document that, according to SAIC, the contingencies used by BPS were high, but as a "conservative" measure, SAIC used BPS's contingencies. The permittee states that the contingencies are appropriate "for a project of this magnitude at the current level of design," that contingencies as small as 4 to 7 percent are appropriate for use only when a project has undergone detailed engineering design and bids have been received from contractors, and that Bechtel had identified a number of considerations that would be better defined during the detailed engineering phase of design that could significantly increase the capital cost above existing estimates.

Response
This comment is responded to in more detail elsewhere in this response to comments. In any event, SAIC used the contingency proposed by the permittee.

34. Comment
PG&E-NEG stated that according to page 4-71 of the July 22, 2002, Permit Determinations Document, SAIC estimated costs for system modifications to allow multi-mode operation during fogging and icing conditions, which in turn would eliminate any need for shutdowns as a result of these conditions. The permittee also states that if conventional plume abatement technology were to be used, EPA's estimates of the cost of a full station retrofit to closed-cycle cooling would be higher than those presented by BPS.

Response
EPA disagrees that the costs of conventional plume abatement would push the cooling system conversion costs either as high as or higher than the costs estimated by the permittee. EPA notes, however, that SAIC did make a significant error in its estimate of the capital cost of plume-abatement cooling towers in its work for the Draft Permit. This error has been corrected and is discussed in detail elsewhere in this response to comments. EPA's consultants SAIC and Abt Associates then developed detailed cost estimates for the use of this technology. The costs of this approach were found to be practicable. Such plume-abatement towers are clearly one option that the permittee can consider for meeting the new permit

limits and addressing water vapor plume issues as needed. Thus, the permittee has several options for meeting the permit limits and it might wish to consider combining some of these approaches (e.g., providing some plume-abatement cooling towers). These issues are discussed in more detail elsewhere in this response to comments.

35. Comment
PG&E-NEG stated that SAIC presented no basis for the costs to allow multi-mode operation, which would be very significant and far greater than the amount allocated in the estimates; and that because the Draft Permit allows only 122 hours of open-cycle operation in any year, the units would still need to shut down frequently, even if multi-mode operation were physically possible, because far more than 122 hours of potential fogging and icing conditions are forecast to result from the 72-cell towers associated with entire station closed-cycle cooling.

Response
EPA disagrees with these comments and has responded to them in detail elsewhere in this response to comments.

36. Comment
The permittee concurred with EPA's decision to adopt BPS's estimates of O&M and auxiliary energy costs.

Response
EPA notes, however, that for the Final Permit it actually decided to use SAIC's estimate of the auxiliary energy penalty because it was **higher** than the permittee's estimate. EPA believed SAIC's estimate was reasonable and would tend to produce a more conservative estimate.

37. Comment
PG&E-NEG stated that SAIC failed to take into account the actual design of BPS in estimating the efficiency losses from installing cooling towers at BPS; that SAIC would not have been able to determine the effect of cooling towers on turbine efficiency with any accuracy unless the turbine's last stage area was known, and SAIC's report does not mention this information; and that BPS's units have very large amounts of last stage area and are thus unusually sensitive to the increases in condenser pressure that would result from the installation of cooling towers.

Response
EPA believes that SAIC's efficiency loss estimate was reasonable and adequately substantiated. The permittee points to generic issues that it says would affect the efficiency loss at BPS but does not provide specific values or calculations to support its position.

38. Comment
PG&E-NEG stated that EPA asserts on pages 4-68 and 4-76 of the July 22, 2002, Permit Determinations Document that BPS might achieve economic gain due to the ability to generate more electricity in peak summer months as a result of using cooling towers, and that Abt's analysis dramatically overstates the amount of income that BPS will be able to gain because Abt uses incorrect values for the price of electricity during these "extra" hours of generation.

Response
EPA notes that the permittee has conceded that this positive economic and energy effect will occur (i.e., that the power plant should be able to generate more electricity during some peak-demand, hot-weather periods as a result of using cooling towers because the new cooling capacity will enable the facility to avoid having to curtail generation as a result of "bumping up against" its maximum discharge temperature limits). EPA believes its estimate of the economic effect of this benefit is reasonable and adequately

explained. In particular, EPA notes that, while the company criticized Abt Associates' use of an electricity price schedule that was originally provided by the company, the company has not provided detailed documentation of the alternative, lower electricity price schedules that it subsequently included in its submissions to EPA, including its comment on the proposed permit. EPA has responded to this comment in more detail elsewhere in this response to comments.

39. Comment
PG&E-NEG stated that EPA asserts on pages 4-76 and 4-77 of the July 22, 2002, Permit Determinations Document that BPS has overestimated the length of time of the outage (in unit-months) required to install entire station closed-cycle cooling. The permittee maintains that SAIC's determination that the outage time was excessive is based on incorrect assumptions regarding construction; that Bechtel concluded that SAIC's engineering approach would cause significant damage to the condensers, which could not practicably be replaced or upgraded; and that even if meaningful information had been provided about the four case studies cited by SAIC as a basis for determining outage length, SAIC's reliance on those case studies is unsupported because none of those cases is comparable to BPS.

Response
EPA maintains that its outage estimates are reasonable and has explained them in detail elsewhere in this response to comments and in EPA's July 22, 2002, Permit Determinations Document. EPA has discussed the case studies above and has explained that they are relevant examples of how outages have been managed at other facilities that have undergone cooling tower retrofits. EPA does not believe that Bechtel's comments indicate or establish that SAIC's design approach, which is based on Stone & Webster's design, would result in damage to the condensers. SAIC's approach also does not rely on replacing the condensers. This issue is also discussed elsewhere in this response to comments.

40. Comment
PG&E-NEG stated that EPA asserts on Pages 4-79 and 4-80 of the July 22, 2002, Permit Determinations Document that SAIC shortened the construction time from 47 to 39 months based on the reduced estimates for constructing each unit's cooling systems, but that the reductions in construction time for each unit were improper and, as a result, the overall reduction in construction time is unsupported.

Response
EPA continues to maintain that its proposed construction schedule is reasonable. This comment is responded to in detail elsewhere in this response to comments.

41. Comment
PG&E-NEG referenced Page 4-82 of the July 22, 2002, Permit Determinations Document and stated that in discussing two errors in BPS's dynamic cost analysis, Abt made a calculation error of its own that overstated the significance of BPS's errors; and that while EPA states that the errors increased the permittee's estimate of the costs of the closed-cycle option by 15 percent, in fact they increased the costs of the closed-cycle option by less than 5 percent.

Response
The permittee's comments on the details of the financial cost analysis are addressed elsewhere in this response to comments, including memoranda by EPA's expert consultant, Abt Associates, Inc.

42. Comment
PG&E-NEG stated that on page 4-83 of the July 22, 2002, Permit Determinations Document, EPA assumes that all construction-related generation outages occur in the last year of the construction period; that this assumption contradicts the schedule developed by Stone & Webster, which shows that outages

would occur throughout the construction period; and that, as a result, Abt's analysis significantly understates the costs of closed-cycle cooling.

Response
EPA has adopted the permittee's estimate of the timing of the construction outages but notes that this does not result in a large cost increase. This issue is addressed in detail elsewhere in this response to comments.

43. Comment
PG&E-NEG stated that on page 4-83 of the July 22, 2002, Permit Determinations Document, EPA chose to use the permittee's estimates of auxiliary power consumption; that this demonstrates bias in EPA's methodology because if EPA had used its own consultant's estimates, its overall cost estimate for the full-station retrofit would have increased about 6 percent; and that while EPA claims to have always used the highest cost estimates, that is not the case here.

Response
EPA's original approach was not reflective of any bias on EPA's part, but EPA has revised its auxiliary power estimate to use SAIC's higher estimate, thereby producing a more conservative estimate. This issue is also addressed in more detail elsewhere in this response to comments.

44. Comment
PG&E-NEG stated that, in reference to Pages 4-84 and 4-85 of the July 22, 2002, Permit Determinations Document, in its dynamic cost analysis, EPA's consultant used spark-spread prices taken from a previous USGen NE submission despite the fact that the company revised them to account for better information in its most recent submission; that those spark-spread prices are unreasonably high; and that, in addition, EPA's consultant assumed almost 60 percent more hours of high spark-spread prices per summer than the evidence in the record would suggest.

Response
EPA believes its consultant's approach to this analysis was entirely reasonable and that the permittee did not provide a compelling justification for its alternative approach. This issue is addressed in detail elsewhere in this response to comments.

45. Comment
PG&E-NEG stated that, in reference to page 4-85 of the July 22, 2002, Permit Determinations Document, that EPA's economic analysis of the effect of plume-reduction technology is based on the unsubstantiated and arbitrary assumption that EPA's proposed multi-mode capability can be built into an entire station closed-cycle retrofit for 25 percent of the already low capital cost estimate that SAIC made; that the only feasible option that BPS explored to avoid plumes, aside from shutting down units, is a plume abatement technology; and that this additional technology would add $70.6 million to the capital cost of the entire station closed-cycle option.

Response
These comments are addressed in detail elsewhere in this response to comments. We will only state here that EPA's estimate of the costs of providing multi-mode capacity to the cooling towers was far from arbitrary, and that EPA has also provided a detailed estimate of plume abatement technology, as well as outage approaches.

46. Comment
PG&E-NEG stated, in reference to with regard to Page 4-85 of the July 22, 2002, Permit Determinations Document, that EPA improperly assumes that there is no increase in maintenance costs with the multi-mode capability it proposes.

Response
EPA believes its approach to maintenance costs was reasonable and appropriate and that no compelling arguments were made to support a different position. EPA notes that for its plume abatement tower cost analysis, it increased maintenance costs to a degree similar to, but slightly higher than, that reflected in the permittee's estimates for that technology. These matters are addressed in detail elsewhere in this response to comments.

47. Comment
PG&E-NEG stated that on page 4-86 of the July 22, 2002, Permit Determinations Document, EPA states that in considering the reasonable life of the capital equipment, "30 years might be a more reasonable figure"; and that EPA's reliance on a 30-year operating life for the technology is inconsistent with the expected lifetime of these technologies based on communications between BPS and the vendors of the technology.

Response
EPA has documented the basis for its conclusion, which also includes discussion with vendors, that a 30-year useful life is a reasonable estimate for this equipment and continues to hold this view. EPA also, however, evaluated costs assuming a 20-year period as urged by the permittee.

48. Comment
PG&E-NEG stated with respect to page 4-86 of the July 22, 2002, Permit Determinations Document that Abt "estimated a market capitalization weighted cost of capital at 11.8 percent"; that this discount rate is unreasonably low; that based on reported market conditions, it appears that Abt's analysis was performed before the end of 2001, and since then, the financial condition of the firms on which Abt's cost of capital estimate is based has significantly deteriorated; and that based on these factors, the 15 percent to 20 percent discount rate used by BPS is likely to be below the discount rate that should be applied.

Response
The discount rate issue is discussed in detail above and elsewhere in this response to comments. EPA notes here only that its consultant, Abt Associates, Inc., did develop a new discount rate estimate based on changed economic conditions as urged by the permittee.

49. Comment
PG&E-NEG stated that EPA states on page 4-86 of the July 22, 2002, Permit Determinations Document that Abt actually discounts back to the beginning of 2002, and that this error leads to an understatement of costs by 5.4 percent for each technology.

Response
EPA and Abt agree that Abt unintentionally erred by discounting back to the beginning of 2002. Abt corrected this error to discount back to mid-2002 as it had intended to do. This issue is addressed in more detail elsewhere in this response to comments.

50. Comment
PG&E-NEG stated that while EPA makes clear on Page 4-96 of the July 22, 2002, Permit Determinations Document that the requirement of a full station retrofit might trigger additional air permitting regulations entirely due to the retrofit, EPA fails to quantify the cost of these additional regulations, which should be included in the cost of the retrofit.

Response
EPA does not agree that it should have included any cost increases as a result of the facility's need to comply with air regulations. The Agency has no reason to believe that any additional costs will be incurred in order to comply with such regulations and that there is no reasonable basis for adding any

costs in this regard. For example, while controlling salt particulate emissions from saltwater cooling towers could be an issue for air pollution control, EPA has no reason for concluding that the drift eliminators proposed by the permittee will not be adequate to address this issue. These issues are also addressed in more detail elsewhere in this response to comments.

51. Comment
PG&E-NEG stated that on page 4-97 of the July 22, 2002, Permit Determinations Document EPA's suggestion that any noise impacts can be mitigated at reasonable cost relies on speculation and is incorrect; that BPS's planned multi-mode design already uses advanced noise mitigation technology comparable to the state-of-the-art; that, as a result, there is no basis for EPA's suggestion that "low noise fans" could further reduce noise levels; and that EPA's suggestion that trees could minimize noise is groundless and that trees are not considered in noise analysis.

Response
These comments are addressed in detail elsewhere in this response to comments.

52. Comment
PG&E-NEG stated that regarding footnote 229 on page 4-97 of the July 22, 2002, Permit Determinations Document, EPA has not provided any basis for its conclusion that the entire station closed-cycle option could be built on the southwest portion of the site near the discharge canal, that EPA has not estimated the cost of this change and how it might proportionally increase the cost of the closed-cycle option, that significant additional large-diameter piping runs would be required, and that relocating the towers away from noise receptors would at most reduce noise levels by 1 to 2 dB(A).

Response
EPA did provide the basis for its suggestion that perhaps some or all of the cooling towers could be built in the stated area of the site. Indeed, this was based, in part, on the permittee's own proposals. EPA did not develop costs for this option because it did not rely on it for any of the alternatives for achieving permit compliance that EPA investigated. EPA noted only that this area might provide some useful flexibility for the permittee. The Agency agrees that there are other ways to implement the closed-cycle options at the site without using this area. Additional discussion of this issue is provided elsewhere in this response to comments.

53. Comment
PG&E-NEG stated that the sources EPA cites in footnote 234 of the July 22, 2002, Permit Determinations Document are not adequate to support EPA's conclusion, consist of general statements made without any reference to the specific circumstances of BPS, and therefore cannot serve to refute BPS's detailed testimony.

Response
EPA believes the references provided in the above-mentioned footnote are relevant, valid matters to consider here. In addition, EPA has addressed this issue and the issue of visible plumes from BPS in more detail elsewhere in this response to comments.

54. Comment
PG&E-NEG stated that EPA's conclusions on pages 4-99 through 4-100 of the July 22, 2002, Permit Determinations Document that "during at least some of the conditions when cooling water fog might occur, naturally-occurring fog would also be likely to occur in the coastal environment of BPS," and "[u]nder such conditions, fogging from the cooling towers would only present a small marginal increase over background conditions" is unscientific and misleading and rests only on the personal observation of an EPA attorney; and that the fact that there might be many hours of naturally occurring fog does not

mean that the fogging caused by the cooling towers is irrelevant, especially because the cooling towers could create fogging and icing conditions very suddenly at times when motorists would not be expecting them.

Response
Although this point was raised in a memorandum written by an attorney documenting a site visit, other EPA technical staff were also present and shared the same empirical observation and common sense conclusion. In addition, EPA hired an outside expert contractor to evaluate TRC and EarthTech's modeling efforts and this expert reached a conclusion similar to that expressed earlier by EPA on this point. See MFG report. This issue is addressed in more detail elsewhere in this response to comments.

55. Comment
PG&E-NEG states that, on page 4-104 of the July 22, 2002, Permit Determinations Document, EPA's stated reasons for questioning BPS's modeling of plume effects are unsupported and speculative, and that none of the alternatives EPA proposes is realistic.

Response
EPA disagrees and these issues are addressed elsewhere in this response to comments.

56. Comment
PG&E-NEG stated that EPA's conclusions regarding the feasibility of developing and using an "early warning system" to address fogging and icing conditions shows that EPA misunderstands the problem of fog or icing due to plume effects; that it will rarely be possible to predict in advance when fogging and icing might occur; that, unlike naturally occurring fog which usually develops over a period of time, small changes in wind directions or other ambient conditions could quickly produce fogging or icing conditions on an otherwise clear day; that the materials to which EPA cites in footnote 271 of the July 22, 2002, Permit Determinations Document do not support EPA's early warning system proposal; and that the Massachusetts Highway Department was skeptical of the feasibility of an early warning system.

Response
EPA does not agree with the permittee's assessment of this issue or its characterization of Agency communications with the Massachusetts Highway Department. Moreover, EPA notes that the permittee's proposed "enhanced multi-mode" system relies on the ability to predict in advance when fogging and icing might occur so that it can bypass the cooling towers without necessitating generating-unit shutdowns. In addition, its proposal to shut down generating units to avoid fogging and icing if it has to use conventional cooling towers also relies on making such predictions. This comment is further responded to elsewhere in this response to comments.

57. Comment
Regarding EPA's statement on page 4-108 of the July 22, 2002, Permit Determinations Document that it "has reviewed the permittee's air modeling analysis and has a number of concerns and questions about it," PG&E-NEG stated that BPS had done a thorough analysis of water vapor plume effects using the CALPUFF model. The permittee further states that EPA has rejected this analysis based on the "critical comments of a handful of individuals" and has not performed an independent analysis of the plume effects that would actually occur. The permittee further stated that the comments on which EPA relies are not criticisms but merely questions about aspects of the model that the viewers did not fully understand, and that those aspects of the model are fully explained in BPS's comments on the Draft Permit.

Response
EPA disagrees with the permittee's characterization of EPA's reservations about the permittee's water vapor plume analysis. The comments and concerns were expressed by expert technical personnel, these

concerns raised significant issues, and the permittee's submissions did not adequately address or resolve these concerns. EPA has since reviewed the new material submitted by the permittee and hired an expert contractor to conduct additional review of this issue. These matters are discussed elsewhere in this response to comments. See MFG report. EPA notes, however, that it concluded from its evaluation that the permittee appears to have overestimated the vapor plume issue.

58. Comment
PG&E-NEG stated that EPA stated on page 4-109 of the July 22, 2002, Permit Determinations Document, "experience of other plants does not appear to corroborate the threat suggested by the permittee"; that this conclusion rests on speculation based on "a few personal phone calls" conducted by an EPA attorney; that EPA did not provide a detailed analysis of similarity of conditions at these "other plants" and at BPS; that among other differences, the cooling tower array contemplated by the Draft Permit is far larger than any facility in the northeastern United States and would be one of the largest arrays in the world; and that, as a result, any conclusion reached on the basis of these phone calls is speculation and inadequate to respond to the comprehensive and detailed information provided by BPS.

Response
EPA's references to experience at other plants were not based on a "a few personal phone calls" conducted by an EPA attorney. That is evident from the record. In addition, EPA did investigate relevant similarities between these plants and BPS, such as whether they are in cold climates and their proximity to highways. Moreover, EPA continues to note that many other plants that use cooling towers have managed to adequately control icing and/or fogging concerns. In any event, EPA has also engaged in further more-detailed analysis of these issues as discussed elsewhere in this response to comments.

59. Comment
PG&E-NEG noted EPA's statement on page 4-109 of the July 22, 2002, Permit Determinations Document that "in the January 1997 NEPCO report, the permittee predicted that although incidents of ground fog can occur during periods of high relative humidity, cool weather, moderate to low winds and inversions or some combination thereof ... it is unlikely however that the fog would extend further than 500 to 1,000 downwind of the towers," and states that the 1997 study was based on a cooling tower array much smaller than the 72-cell array proposed by EPA and did not include a formal evaluation of fogging and icing.

Response
EPA notes the permittee's points regarding the limitations of Stone & Webster's work conducted on behalf of the prior plant owner, the New England Power Company. However, EPA also notes that these conclusions are consistent with other general information collected regarding vapor plumes from cooling towers. See EPA's July 22, 2002, Permit Determinations Document, page 4-109. The vapor plume issue is discussed in more detail elsewhere in this response to comments. See MFG report.

60. Comment
PG&E-NEG commented that EPA's statement on page 4-110 of the July 22, 2002, Permit Determinations Document that "as a matter of common sense it does not seem that the problem should be severe enough to require hundreds of hours of generating unit outages," is speculative and unresponsive to the detailed analysis submitted by BPS. The permittee stated that EPA might not simply ignore the comprehensive information that BPS has provided on this subject by an "unsupportive [sic] appeal to common sense."

Response
EPA disagrees. EPA's comment was based on its review of the vapor plume issue, including the data presented by the permittee, and the experience of other power plants. Based on the very few hours of ice or fog that even the permittee predicted, the hundreds of hours of claimed outages seem unreasonable as a

matter of common sense. Morever, to EPA's knowledge, this outage approach would be an atypical solution to the problem because no information has been provided that indicates any electric generating facility operates in such a manner. The company admits that the station is not designed to operate under such conditions. Furthermore, EPA hired a consultant to conduct an additional more-detailed analysis of the plume issue, and EPA has concluded from this work that the plume issue should be manageable, and that the permittee appears to have substantially overstated the plume problem and the number of hours of outage that would be needed under the permittee's approach. EPA also assessed costs both accepting the outages assumed by the permittee, and assuming the installation of plume-abatement cooling towers to obviate the plume issue. Both approaches would be economically feasible, but the plume-abatement tower approach (or the use of some plume abatement tower cells) would likely provide more operating flexibility to the permittee (i.e., would avoid outages), if the permittee believes the plume issue warrants taking that step. The vapor plume issue is also discussed in more detail elsewhere in this response to comments.

61. Comment

Regarding EPA's statement on page 4-122 of the July 22, 2002, Permit Determinations Document that "BPS has long been a very profitable plant, and it will remain so after the improvements associated with the Closed-Cycle Entire Station option are installed," PG&E-NEG stated that EPA's estimate of the ultimate financial impact of the entire station closed-cycle option understates that impact by a factor of 10. The permittee stated that this is partly because EPA's cost estimates are unreasonably low, and partly because EPA overstates BPS's baseline profitability by 171 to 254 percent due to flawed forecasting, the lack of consideration of property taxes, incomplete operating and maintenance costs, and a discount rate that is below a reasonable level given the financial state of the merchant power industry.

Response

EPA disagrees. EPA's consultant, Abt Associates, Inc., has made some particular adjustments to its financial impact analysis (e.g., changed discount rate, addressed property tax values provided by the permittee's comments). However, EPA's overall conclusion remains the same—the costs of permit compliance are achievable, and BPS will remain very profitable after these expenses are undertaken. These issues are addressed in greater detail in a Memorandum from Michael Fisher, Abt Associates, Inc., to Mark Stein, Damien Houlihan, EPA Region 1; Shari Goodwin, Tetra Tech, Inc., "Financial Impact of Closed Cycle System Installation at Brayton Point Station" (August 12, 2003) (the "August 12, 2003, Financial Impact Report"). While this memorandum is part of EPA's Administrative Record, it is not included as an appendix to this response to comments or included in the publicly available record because some of the analysis contained therein relies on information that the permittee has designated as Confidential Business Information (CBI) and EPA's current view is that some of this CBI could be revealed if the memorandum was released. This issue is also addressed in more detail elsewhere in this response to comments.

62. Comment

PG&E-NEG referenced EPA's statement on page 4-122 of the July 22, 2002, Permit Determinations Document, "BPS has long been a very profitable plant, and it will remain so after the improvements associated with the Closed-Cycle Entire Station option are installed," and stated that EPA misleadingly omits information about who ultimately bears the costs of conversion to the closed-cycle entire station option; that "a significant part of the lost 'profits' is actually a loss to the U.S. Treasury" of approximately $144 million in present value terms; and that the remaining loss, to the extent it cannot be offset through higher electricity rates, will be paid by shareholders, including individual investors and pension funds and mutual funds that benefit individuals, in the form of reduced returns on their investments.

Response
This issue is addressed elsewhere in this response to comments. Nothing about EPA's discussion of this matter was misleading. EPA acknowledged that the costs of permit compliance would have an impact on the permittee's profits. The effect on Federal tax revenues is not a required consideration in applying these CWA standards, and there was nothing misleading about not trying to estimate or discuss such potential effects.

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Comment
Some commenters supported EPA's determination of BAT effluent limitations in the Draft Permit. (1132, 1150) One noted that EPA appropriately used its BPJ in determining the BAT effluent limitations for BPS by thoroughly considering the six factors required under CWA § 304(b)(2)(B), including costs. The commenter pointed out that although BPS urges EPA to give costs more attention, EPA has substantial discretion in the weight it gives to the factor of cost. Moreover, the commenter noted that the U.S. Supreme Court has interpreted the CWA to mean that BAT requires a commitment of the "maximum resources economically possible to the ultimate goal of eliminating all polluting discharges." The commenter concluded that even if EPA did not have such discretion, "BPS's cost related arguments have very little to do with the 'economic cost of achieving the effluent reduction' required by the Draft Permit, and very little relevance to the 'commitment of maximum resources economically possible' for BPS as required by the Clean Water Act." (1150). Another commenter agreed with EPA's determination that closed-cycle cooling throughout the plant satisfies BAT. (1132).

Response
EPA agrees with the comments, except that the Agency feels that the permittee did provide a substantial number of comments addressing the question of the "cost of achieving the effluent reduction" that would be required by the Draft NPDES Permit. Specifically, having essentially accepted that closed-cycle mechanical draft wet cooling towers would be the most cost-effective way to meet the thermal discharge reductions required by the Draft Permit, the permittee then presents comments regarding the cost of making such cooling system improvements at BPS. The permittee's comments dispute EPA's assessment of such costs and present alternative cost estimates. EPA has addressed these comments, however, elsewhere in this document.