

Quality Assurance Project Plan

Environmental Protection Agency's Verification of the Department of
Energy's CAP88-PC WIPP Release Dose Calculations

Prepared by the Office of Air and Radiation

Office of Radiation and Indoor Air

Radiation Protection Division, Center for Waste Management and
Regulations

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May 28, 2014

Revision 0

Document Approval Form [A1]

Product Title: Environmental Protection Agency's Verification of the Department of Energy's CAP88-PC WIPP Release Dose Calculations

Purpose: Corroborating calculations to provide confidence that the Department of Energy's Dose and Risk CAP88 Version 3 calculations for the February 14th, 2014 fall below the regulatory limits.

Project Organization/Task (A4)

Signatures:

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Date:

May 28, 2014

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Tom Peake, Center for Waste Management and Regulations

Date:

5-28-14

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Date:

5-28-14

This Quality Assurance Project Plan has been prepared in accordance with requirements described in EPA QA/G-5. *Guidance for Quality Assurance Project Plans*, EPA QA/G-5” United States Environmental Protection Agency, EPA/240/R-02/009, Office of Environmental Information, Washington, D.C., December 2002

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Revision History

WIPP/QAPP-1 Revision History

Rev. DCN

Responsible Party and Official Date

0 WIPP/QAPP-1

Kathy Economy 2014-05-28

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Distribution List [A3]

Quality Assurance Project Plan – Environmental Protection Agency’s Verification of the Department of Energy’s Analysis Plan for Verifying DOE’s CAP88-PC WIPP Release Dose Calculations

WIPP /QAPP-1
 Revision 0
 May 13, 2014

Distribution List		
Name	Title	Organization
Lindsey Bender	Quality Assurance Coordinator	ORIA
Jonathan Edwards	Director	RPD
Alan Perrin	Deputy Director	RPD
Lee Veal	CREM Director	RPD
Tom Peake	CWMR Director	RPD
Reid Rosnick	CWMR Physical Scientist/Reviewer	RPD
Jonathan Walsh	CWMR Physical Scientist/Reviewer	RPD
Jerome Puskin	CST Director	RPD
Lowell Ralston	Radiobiologist/reviewer	RPD
Daniel Schultheisz	CWMR Associate Director	RPD

Supplementary Distribution List

Other copies may be sent as necessary by the RPD Director or Deputy Director.

Note: This Quality Assurance Project Plan (QAPP) has been prepared in accordance with a checklist developed for the EPA, Office of Water, for the training “Quality Assurance Strategies for the Use of Existing Data(Literature, Databases, Studies, etc.) presented in February 2013 and March 2014 to EPA. This checklist is titled “Modified QAPP Format for Existing Data Projects.” It was determined that this format was most appropriate one for this QAPP. A crosswalk between this “Modified” checklist and the checklist presented in EPA QA/G-5.

Guidance for Quality Assurance Project Plans, EPA QA/G-5 " United States Environmental Protection Agency, EPA/240/R-02/009, Office of Environmental Information, Washington, D.C., December 2002, was performed and all elements in the G-5 checklist are addressed. The G-5 checklist references are noted in [square brackets] following the section title. The section titles are in accordance with the "Modified" checklist.

A. Background [A5] [A7] [B1] [B3] [B4] [B9]

At the Waste Isolation Pilot Plant (WIPP) an airborne radionuclide release occurred on February 14th, 2014 at approximately 2314 Mountain Standard Time. The releases triggered the Continuous Air Monitoring (CAM) probe located in the exhaust side of Panel 7, the current panel in which waste was being emplaced in the repository. At approximately 2315 the ventilation system was switched from reduced ventilation (3,395 m³/m, 120,000 ft³/m) to filtration mode (1,699 m³/m, 60,000 ft³/m). The releases originated from the repository and passed up through the exhaust shaft then vented through the WIPP HEPA filtration system. High levels of alpha and beta readings were detected at WIPP's Station B Fixed Air Sampling station located just downstream from the HEPA filter exhaust. Elevated releases to the atmosphere lasted approximately 90 hours.

Per 40 CFR 61.92, it is stated that the DOE is to assure no individual will be exposed to more than 10 mrem per year of a radionuclide. Specific to radionuclide emissions, specified in 40 CFR 61.93 DOE Subpart H, the DOE is required to determine the effective dose of exposed individuals within a 3-km radius of the facility using one of two EPA approved computer models, CAP-88 or AIRDOS-PS. And per 61.93 9 (b) (4) (i), periodic confirmatory monitoring is invoked if releases from a DOE facility are in excess of the 1 % of the standard (0.1 mrem/annual dose). The DOE performed dose and risk calculations for this incident using the CAP88-PC computer model, Version 3. The source term was DOE-derived radiological data, collected from the Fixed Air Monitoring Station (FAS) located downstream from the Station B exhaust duct, and analyzed at DOE WIPP Laboratories.

Results of DOE's modeling are reported in an March 12, 2014 email transmission, *CAP88 Special Input/Output files* (Stewart Jones to Tom Peake) and indicated the highest effective dose equivalent was just outside of the WIPP exclusive use area (the WIPP fence line). This location is 347 meters NW of the Station B exhaust duct. The calculated effective dose equivalent was 0.67 mrem, which is below the 10 mrem annual regulatory dose limit specified in 40 CFR 61.92.

A.1 Problem Definition [A5] [B2] [B3] [B9]

A.1.1 Goal [A5] [B1]

Globally, the intent of this exercise is to assure DOE's reported dose is reproducible. The Agency will perform effective dose calculations using CAP88, as specified in 40 CFR 61.92, to assure the WIPP Station B releases do not exceed the 10 mrem regulatory, as required in 40 CFR 60.92.

A.1.2 Objective [A5] [B1] [B3] [B4] [B10]

Specific to the goal, the objective of this exercise is to use various versions of CAP88 to replicate DOE calculations. Specifically, EPA will perform the following simulations;

1. The Agency will run a set of dose calculations using CAP88 Version 3 and use the same DOE-derived source term. The intent is to replicate DOE results.
2. The Agency will run a set of dose calculations using CAP88 Version 4 in addition to Version 3. All inputs, including the source term, will be the same as that used by DOE in their CAP88 Version 3 calculation.
 - a. The Agency will identify the target individual as an adult. In this way the Agency will be able to compare doses and risks to the results from CAP88 Version 3. Differences between Version 3 and Version 4 results will be assessed and recorded.
 - b. The intent is to determine whether that releases from Station B do not do not exceed the 10 mrem regulatory limit as required in 40 CFR 60.92.

A.2 Task Description [A6] [B1] [B3] [B4] [B7] [B9] [B10]

Specifically, EPA will perform the following simulations;

1. The Agency will run a set of dose calculations using CAP88 Version 3 and use the same source DOE-derived source term, and documented in an email transmission titled, CAP88 *Special Input/Output files* (Jones, Stewart. March 12, 2014, Email Transmission to Tom Peake).
2. The Agency will run a set of dose calculations using CAP88 Version 4 in addition to Version 3 and use the same source term used by DOE identified in the above memo.

The Agency will identify the target individual as an adult. In this way the Agency will be able to compare doses and risks to the results from CAP88 Version 3. Differences between Version 3 and Version 4 results will be assessed and recorded.

A.3 Task Organization [A4] [A8] [B5] [B4]

A.3.1 Analysts

Kathleen Economy – Project Lead (Project Analyst) This task will be coordinated by Kathleen Economy, with the EPA’s Center for Waste Management and Regulations (CWMR), Radiation Protection Division (RPD). Ms. Economy will be performing some of the CAP88 simulations and documenting the results. Ms. Economy serves as an EPA regulator on EPA’s WIPP Performance Assessment team. Ms. Economy is responsible for maintaining the official, approved QAPP. Ms. Economy will be running CAP88 Version 3 and Version 4 using the DOE inputs. She will ensure that all team members on the distribution list will have access to the current revision of the QAPP by email communication.

Lowell Ralston –Radiobiologist with the EPA’s Center for Science and Technology (CST), RPD. Dr. Ralston has extensive experience investigating the health effects of radionuclides given various exposure levels and pathways. Dr. Ralston will be participating in these CAP88 confirmation analyses.

A.3.2 Management

Tom Peake –Center Direction, Center for Waste Management and Regulations (CWMR), Radiation Protection Division (RPD). Mr. Peake provides management direction to the project and reviews the QAPP development and final report. Mr. Peake ensures the project has gone through the ORIA pre-dissemination process (ORIA SOP#3, *Pre-Dissemination Review*) before the report is released.

A.3.3 Technical Review

A technical review will be performed by a staff member of EPA’s CWMR, RPD, either Mr. Daniel Schultheisz or Mr. Jonathan Walsh are slated for his task. The individual who will serve as the technical reviewer will be dependent on their individual tasks and schedules at the time of the review.

Daniel Schultheisz -Physical Scientist with the EPA’s CWMR, RPD. Mr. Schultheisz serves the Associate Center Director for CWMR. Mr. Schultheisz provides management direction and technical support to the Center Director.

Johnathan Walsh-Physical Scientist with the EPA's CWMR, RPD. Mr. Walsh serves as an EPA regulator on EPA's WIPP Performance Assessment team. Mr. Walsh has some experience running the CAP88 computer code and will serve as a technical reviewer for this exercise.

Independent Technical Reviewer-

Reid Rosnick - Physical Scientist with the EPA's CWMR, RPD. Mr. Rosnick is the Project Manager for updates and revisions to the CAP88 computer model and program. Mr. Rosnick will serve as an Independent Technical Reviewer for the CAP88 calculations described in this activity.

A.3.4 Quality Assurance

Lindsey Bender- Quality Assurance Coordinator with the EPA's CWMR, RPD. Ms. Bender also serves as the WIPP QA point of contact for the Ms. Bender is not involved in this project except for the QAPP review and QA consultations and is independent from the project.

A.4 Overall Quality Objective and Criteria [A7] [B1] [B4] [B6] [B7] [B8] [B9] [B10]

This Quality Assurance Project Plan describes a set of calculations to be performed by the Agency that are expected to corroborate DOE's CAP88 calculations. First, the Agency will run a calculation with Version 3 of CAP88-PC and use DOE's derived radiological data as the source term. The Agency will rerun the same calculations but use CAP88-PC Version 4. CAP88-PC Version 4 is an improvement from Version 3. Most notably, Version 4 is able to include more isotopes due to ingrowth and decay, determines age-specific doses and risks from inhalation/ingestion rates, and has a more refined ground build-up and removal rate for specific isotopes. Because of these improvements the doses from Version 3 will differ from that of Version 4. No difference in the results is expected between DOE's CAP88 Version 3 runs those performed by EPA's. Because CAP88 Version 4 includes incorporates age-specific inhalation and consumption rates, differences for risk and doses between the Version 3 and Version 4 simulations are expected. The difference is not known at this time and it is premature to discuss the differences at this time.

The Agency's intent to perform these additional calculations is to provide confidence that the doses to the public are within the regulatory limits as specified in 40 CFR 61.102 (10 mrem/year) and do not exceed 10 % of that limit (1 mrem/year).

The Agency's switch to Version 4 for most of this exercise is based on a migration for all Agency computer from the Microsoft XP to Windows 7 operating system. Version 3 of CAP88-

PC does not work on Windows 7. Doses from this set of CAP88 Version 4 calculations will be assessed at the same populated locations that used by DOE with their CAPP88 Version 3 runs.

A.5 Special Training - Team Members [A8] [A9]

Team Members will include EPA analysts and scientists within the Office of Radiation and Indoor Air, Radiation Protection Division (RPD). Members from two Centers within RPD will participate, the Centers for Waste Management and Regulations (CWMR) and Science and Technology (CST). Individuals from the two Centers either have had experience in the development of CAP88 or serve as a regulator for WIPP. Details of the team and their experience are given in A.6 Task Organization.

A.6 Project Documentation of Results [A9]

The final product will be a report titled *Environmental Protection Agency's Verification of the Department of Energy's Analysis Plan CAP88-PC WIPP Release Dose Calculations*. The Team Lead, Kathleen Economy, will be responsible for developing, coordinating reviews, and final production. The report will be made available to the public posted on the EPA WIPP Air-Docket.

B. Data Needs, Sources, and Criteria [B1] [B2] [B3] [B9] [B10]

All the input files used by DOE in their CAP88 simulations were electronically transmitted to EPA. The file names were identified in the EXCEL files titled *EventInputIndex.xls*. The *EventInputIndex.xls* file identifies all the input files.

B.1 Source Term [A5] [B1] [B2] [B3]

The source term is listed in DOE's EXCEL spreadsheet titled:
VALDy_Rad_B_Compilation_Input.xlsx

DOE Data –The Agency will verify DOE's CAPP88 by conducting a replicate calculation with CAP88-PC Version 3 using the same DOE source term. The radiological isotopic data used in the DOE calculations were cumulative activities for Pu-239, Pu-239/240, U-238, Am-241, Cs-137. This data is originally derived from the Station B Fixed Air Sample (FAS) filter. The Station B FAS filter collects the global activity, as total alpha/beta disintegrations per minute (dpm). The filter was removed from the FAS, transported to the DOE lab where it underwent laboratory analysis to determine the individual radiological components that contributed to the

global activities. The isotopic components of subsequent filters were estimated based on laboratory analysis conducted on the first filter collected on February 15th after the incident.

Note, once the underground CAM alarm sounded (at 2313 on February 14th 2014) the underground ventilation was switched to filtration mode. In filtration mode the isolation dampers, located between the ducts that separate Station A and B exhaust, are closed and redirect air to through the filter bank via the filter bank ducting. Filtered air is exhausted via Station B. The switch to filtration mode took approximately 60 seconds and prevents no mine exhaust air to exit through the Station A ducting. It takes approximately 30 minutes for an underground 'air particle' located near the entrance to Panel 7 to travel to the Station A exhaust point. Therefore, the rapid 60 second switch to filtration mode prevented contaminated air originating at this point to exit from the underground via the Station A exhaust. However, there were a few leaks in the isolation dampers separating Station B exhaust and the filter bank bypass ducting. This caused a minute quantity of unfiltered exhaust air to bypass the HEPA filters and exit the Station B exhaust ducts causing a minute amount of radionuclide to be released from the Station B exhaust.

B.2 Population Files [B1]

The population file used by DOE will be the same as used by EPA in this replicate calculation are labeled as: WIPP2010.pop

The Agency will use the same population files DOE used in their CAP-88 runs. Population is taken from the 2010 U.S. Census Bureau within an 80 km (50 mi) radius. DOE updates the 2010 census file to reflect the population that lives within a 6.4 km radius (10 mi) of WIPP as of the close of year 2012.

B.3 Meteorological Files [B1]

Meteorological data input into the model will be that data collected at the DOE meteorological tower. The tower is located 600 m (1,970 ft) northeast of the waste handling building. This station measures precipitation as well as wind speed, wind direction, relative humidity and temperature at 2, 10, and 50 m (6.5, 33, and 165 ft)

The following meteorological files used by DOE will be the same as used by EPA in this replicate calculation:

Wind files: ValDyWka.wnd

Average Temperature Files: 15.39 degrees C (this value was rounded up to 15.4 degrees C in DOE's summary file)

Total Precipitation for that time period: 0.00 mm (Version 4 requires a non-zero value for precipitation. A very small number approaching zero is acceptable. EPA will use 0.01 as the precipitation input value.)

Absolute Humidity: 8 gr/meter³

B.4 Population Centers and Locations [A5] [A6] [D1] [B2]

The population centers and locations for the assessed dose calculations are listed in the table below.

Distance From Exhaust Shaft to Fence Line Intersect Exclusive Use Area			
Direction From Exhaust Shaft	Distance (m)	Distance (km)	Distance (mi)
NW, S	347	0.347	0.22
SSE	376	0.376	0.23
N, SE	490	0.490	0.30
NNW, NNE	530	0.530	0.33
W, SSW, E	592	0.592	0.37
WNW, WSW, ESE, E	646	0.646	0.40
NW, NE	691	0.691	0.43
SW	778	0.778	0.48
Population Centers Within 80 km of WIPP Station B Exhaust			

Description	Population	Distance (m)	Distance (km)	Distance (mi)
James Ranch (Mills)	5	5240	5.24	3.26
Smith [Crawford] Ranch	1	7186	7.19	4.47
Mobley Ranch	0	9580	9.58	5.95
Pue Ranch	5	15495	15.5	9.63
Malaga CDP	147	32187	32.19	20
Loving CCD	2179	32187	32.19	20
Loco @ 20 mi NW	150	32187	32.19	20
Livingston Wheeler	609	45062	45.06	28
Carlsbad city	26138	48280	48.28	30
Loco Hills	149	48280	48.28	30
Loving Co (Red Bluff & Orla)	74	51499	51.5	32
Happy Valley (CDP)	519	56327	56.33	35
White City (DP)	7	61155	61.16	38
Monument CDP	206	64374	64.37	40
Eunice CCD	1610	64374	64.37	40
Kermit City *	5708	67593	67.59	42
JAL CCD *	3220	72421	72.42	45
Atoka CDP *	1077	72421	72.42	45
Lovington *	5505	80467	80.47	50
Nadine CDP *	376	80467	80.47	50
Hobbs CCD *	21653	80467	80.47	50
*The CAP88 code limits the predicted dose to within an 80 km radius. Because Lovington, Nadine, and Hobbs are slightly over 80 km from the WIPP release point, their dose calculations will be considered as 'qualified' estimates.				

C. Data Management, Control, Storage

C.1 Data Management [A9] [B10]

Input and results will be copies of the CAP88 output files. Hard copies of each simulation will be printed and converted to a *.pdf files. All results of these simulations will be separately stored on the EPA G: drive (G:\OAR-ORIA-SHARE\CWMR\CFR\WIPP\CAP88).

C.2 Data Entries [B10]

Data entries are recorded on the CAP88 *.dat files. These will serve as the record that the proper and correct data will be input into the model.

C.3 Merging or Uploading Electronic Data from Existing Sources [B10]

The executable files for CAP88 Version 3 and Version will be downloaded and installed into the appropriate analysts computers from the EPA CAPP88 website (as of the date of this QAPP the website is <http://www.epa.gov/radiation/assessment/CAP88/>). The DOE input files will be transferred to the appropriate directory per CAP88 executable directory structure for the specific model runs.

C.4 Data Review [B5] [D1]

Input and output data will be reviewed as part of the technical review. The review will cross-check that all used in the replicate simulations used the same input values as was done in the DOE CAP88 Version 3 simulations. The results of the output data are properly linked to the specific and appropriate input data. All input and output files and data are converted to '*.pdf' files and stored on EPA's "G:" drive listed in the following section.

C.5 Data Storage and Manipulation [B10]

The results will be stored on the project lead analysts computer, then uploaded on a dedicated hard drive space used for the sole purpose of ORIA on EPA's 'G' drive with the following directory path:

G:\OAR-ORIA-SHARE\CWMMR\CFR\WIPP\CAP88

D. Data Quality Verification and Data Quality Reporting [B5] [D1] [D2]

Verification and data qualification of the source term data used in these analyses is outside the scope of this exercise /project. CAP88-PC Version 4 is an improvement from Version 3. Most notably, Version 4 is able to include more isotopes due to ingrowth and decay, determines age-specific doses and risks from inhalation/ingestion rates, and has a more refined ground build-up and removal rate for specific isotopes. Version 4 of CAP88 includes more isotopes due to ingrowth and decay, determines age-specific doses and risks from inhalation/ingestion rates, and has a more refined ground build-up and removal rate for specific isotopes. Because of these improvements the doses from Version 3 will differ from that of Version 4. It is premature to discuss what these differences will be

D.1 Data Review, Verification, and Validation [B5] [D1] [D2] [D3]

All databases and reports will be reviewed by technical reviewers with expertise in either radiological data analysis, EPA CAP88 developers, or technical analysts within EPA's Radiation Protection Division team. These individuals, collectively, have experience and knowledge of NESHAP requirements and general WIPP regulatory issues.

D.2 End Product - Use of this Analysis

The results of this exercise is to corroborate that the DOE dose calculations are reproducible. These calculations will be run using the CAP88 Version 3 computer model, the output predicts the annual dose calculations to a maximally exposed individual given the February 14th 2014 release incident at the WIPP site from Station B. EPA will perform additional calculations using Version 4 of CAP88. Version 4 is a refinement of Version 3 in that it can calculate age specific doses. CAP88-PC Version 4 is able to include more isotopes due to ingrowth and decay, determines age-specific doses and risks from inhalation/ingestion rates, and has a more refined ground build-up and removal rate for specific isotopes. Because of these improvements the doses from Version 3 will differ from that of Version 4. To predict how significant these differences will be, whether they will increase or decrease, is premature. What is of importance is to know whether releases are below the regulatory limit of 10 mrem/year, per 40 CFR 61.92 and the and whether they exceed the 0.1 mrem/year periodic confirmatory trigger value as specified in 40 CFR 61.93 (b) (4) (i).

D.3 Final Verification [B5] [D2]

The final set of calculations will be double checked by a technical reviewer to assure there are no errors in the input values. This is accomplished by checking the summary files for CAP88 Version 3 and Version 4, denoted with the *.sum suffix. The check will include the following:

1. Time of the computer simulation
2. Specific input parameter values
3. Location of input files
4. Location of output files
5. The goal is met:
 - a. Results of EPA's separate calculation determine the effective dose equivalent of a maximally exposed individual due to the releases from Station B at WIPP—initiated the morning of February 14th, 2014 —using the computer model CAP88 Version 3 are equivalent to DOE's results.

- b. Separate simulations, using the same inputs for this incident, but performed on the updated version of CAP88, Version 4, should indicate releases from WIPP Station B will be within the regulatory limit of 10 mrem/year.
6. The objective is met – Corroboration of DOE calculations demonstrates releases from the February 14th WIPP incident were still within the regulatory limit of 10 mrem/year.

D.4 Reports to Management [B5] [C2] [D1]

This ORIA SOP#3 Pre-Dissemination Review process has been initiated for this project. The project will be approved in accordance with the ORIA SOP#3. Management has been made aware of the project and the SOP#3 form will be processed through the appropriate channels. This process includes a concept, draft review and final phase where management sign-off is required. The final report will have management review.

E. Review of QAPP

In accordance with *Guidance for Quality Assurance Project Plans*, EPA QA/G-5, EPA/240/R-02/009, December 2002, the Project Lead for this QAPP (WIPP/QAPP-1) used a checklist provided by the Office of Water for training on *QA Strategies for Existing Data*. The crosswalk between this QAPP and the G-5 checklist (G-5 Appendix C, Checklist Useful in QA Project Plan Review as specified in the ORIA Quality Management Plan) is provided in the table below. The ORIA Quality Management Plan requires use of the G-5 checklist or equivalent. This crosswalk provides the equivalence. This QAPP has the G-5 elements put in [square brackets] after the section title to track the crosscheck.

WIPP/QAPP-1	G-5, Appendix C
A.1 Title & Approval sheet	A1. Title & Approval Sheet
A Table of Contents	A2. Table of Contents
Distribution list	A3. Distribution List
Task Organization	A4. Project/Task Organization
A Background, Goal, Objective	A5. Problem Definition/Background
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A.4 Overall Quality Objective & Criteria	A7. Quality Objectives an Criteria
A.5 Special Training-Team Members	A8. Special Training/Certifications
A.6 Project Documentation of Results	A9. Documentation and Records
B Data Needs, Sources & Criteria	B2. Sampling Methods B3. Sample Handling & Custody B9. Non-direct Measurements
B.1 Source Term B.2 Population Files	B1. Sampling Process Design (Experimental Design) B3. Sample Handling & Custody
B.4 Population Centers and Locations	A5. Problem Definition/Background A6. Project/Task Description B2. Sampling Methods D1. Data Review, Verification, & Validation
N/A	B3. Sample Handling & Custody
A.4.2, A.5	B4. Analytical Methods
D.1.2, A6, C4, D1.1, D.1.2, D.3, D.4	B5. Quality Control
A.7	B6. Instrument/Equipment Testing, Inspection, & Maintenance
A.7	B7. Instrument/Equipment Calibration & Frequency
N/A	B8. Inspection/Acceptance for Supplies & Consumables
A.5	B9. Non-direct Measurements
C.1, C.2, C.3, C.5 (data storage & manipulation)	B10. Data Management
N/A for this QAPP	C1. Assessments & Response Actions
D.4 Reports to Management	C2. Reports to Management
C.4 Data Review, D.1.1 Data Quality Verification & Data Quality Reporting D.1.2	D1. Data Review, Verification, & Validation
D.1.2, D.3	D2. Verification & Validation Methods
D.2	D3. Reconciliation with User Requirements
E.1 Review of QAPP	E.1 Crosswalk of QAPP checklist

The above is a checklist developed for the EPA, Office of Water, for the training “Quality Assurance Strategies for the Use of Existing Data (Literature, Databases, Studies, etc.) presented in February 2013 and March 2014 to EPA. This checklist is titled “Modified QAPP Format for Existing Data Projects.”

References

Jones, Stewart. Email Transmission: March 12, 2014. Subject: *CAP88 Special Input/Output files*. Email from Stewart Jones to Tom Peake. Stewart Jones, Nuclear Waste Partnership LLC, Department of Energy Contractor, Tom Peake, U.S. EPA (Office of Air and Radiation, Office of Radiation and Indoor Air, Radiation Protection Division, Center for Waste Management and Regulations)

U.S. Department of Energy. 2014, *Excess Cancer Risk for the February 14th Contamination Release*, Rev. 1., March 10, 2014 Memo

U.S. Environmental Protection Agency. 2002. Title 40 CFR Part 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities". Federal Register, vol. 67 (revision, September 9, 2002)

U.S. Environmental Protection Agency. 1993. Title 40 CFR Part 191, Subpart A, "Environmental Standards for Management and Storage" Federal Register, vol. 58 (December 24 20, 1993)

U.S. Environmental Protection Agency. 2002. *Guidance for Quality Assurance Project Plans*, EPA QA/G-5, EPA/240/R-02/009, December 2002.

U.S. Environmental Protection Agency. February 2013. Office of Water. *Modified QAPP Format for Existing Data Projects, (Literature, Databases, Studies, etc.)*, a checklist. From Office of Water February 2013 presentation titled, *Quality Assurance Strategies for the Use of Existing Data (Literature, Databases, Studies, Etc.)*.