



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

Ref: 4WD-SRB

APR 25 2011

Mr. Prashant K. Gupta
Honeywell International, Inc.
4101 Bermuda Hundred Road
Chester, VA 23836

Re: Final Baseline Environmental Risk Assessment (BERA) for Operable Unit 1(OU1)
(Estuary) LCP Chemicals Superfund Site, Brunswick, Glynn County, Georgia

Dear Mr. Gupta:

The purpose of this letter is to transmit the final Baseline Ecological Risk Assessment (BERA) for Operable Unit 1 (OU 1) of the LCP Chemicals Superfund Site (Site), in Brunswick, Glynn County, Georgia, which has been modified by the Environmental Protection Agency (EPA or Agency), pursuant to Paragraph A in Section VIII of the 1995 Administrative Order by Consent for Remedial Investigation/Feasibility Study, EPA Docket No. 95-17-C (AOC). This finalized BERA incorporates information Honeywell International, Inc. (Honeywell) provided in several draft BERA submissions and reflects substantial changes made in response to issues raised by Honeywell representatives in an August 10, 2010, meeting with EPA representatives and in August 18, 2010, and September 10, 2010, letters to EPA from Adam Sowatzka, counsel for Honeywell.

1. Response to August 18, 2010 Letter

In his August 18, 2010, letter, Mr. Sowatzka, on behalf of Honeywell, questioned EPA's decision to exclude the 2006 Apparent Effects Threshold (AET) Study results in developing remedial goal options (RGOs) for benthos for mercury and Aroclor 1268, as well as EPA's concerns about the 2006 AET study design. In addition, Mr. Sowatzka argued that EPA's selections of the RGOs for mercury and Aroclor 1268 are unsupported by the data available. Finally, he asked EPA to remove language in the final version of the BERA which requires application of a "not to exceed criterion" to the benthic RGOs.

a. Apparent Effects Threshold (AET)

Contrary to Mr. Sowatzka's assertion, EPA did not reject the results of Honeywell's 2006 AET Study, nor did EPA object to Honeywell's development of AET values. As indicated in numerous previous communications with Honeywell representatives, EPA agrees that AETs, if calculated correctly, are acceptable and useful endpoints. However, it is the Agency's position that sole reliance on the AET benchmark for assessing sediment toxicity and for estimating RGOs for mercury and Arocolor 1268, as well as for the other contaminants of potential concern (COPCs) at the LCP Site, is inappropriate. The AET

benchmark should be supplemented with other interpretive metrics for such assessments and conclusions. In fact, Honeywell's Work Plan for the 2006 monitoring study acknowledged EPA's desire to better understand the causes of laboratory-based toxicity from surface sediments at the Site and included multiple analyses intended to meet this objective.

As Mr. Sowatzka stated in his letter, AETs are concentrations of specific chemicals in sediment above which significant adverse biological effect always occurs. Although EPA recognizes the value of calculating the AETs for mercury, Aroclor 1268 and the other COPCs, for the benthic community, the Agency is concerned about effects that may occur between the non-toxic concentration and the always-toxic concentration, especially when, at sites like the LCP Site, toxicity is frequently observed at concentrations well below the AETs (See BERA Tables 22 and 23). Other, more widely used sediment benchmarks, including calculations of effect range-low (ER-L), effect range-medium (ER-M), threshold effect levels (TELs), and probable effects level (PELs) for each COPC are also necessary because they provide a range for assessing risk to the benthic community. Since Honeywell provided few other direct comparisons of sediment concentrations with effects, EPA employed additional methodologies to identify other potential sediment effect concentrations based on exposure (sediment concentrations) and response (toxicity) data in the final BERA.

In addition, since both mercury and Aroclor 1268 are persistent contaminants that biomagnify in the food web and put higher trophic level receptors, such as piscivorous fish, birds, and mammals, at greater risk, EPA also modeled chemical doses to higher trophic level receptors and compared them to toxicity reference values (TRVs). The resultant hazard quotients (HQs) included in the BERA are used as measures of receptor-specific ecological risk.

The importance of using additional benchmarks to help identify the RGOs was repeatedly discussed well before the August 10, 2010 meeting between EPA and Honeywell representatives. In fact, Honeywell itself frequently acknowledged the benefits of using multiple approaches for interpreting chemical toxicity relationships. In Section 3.1.3.3 of its 2005 Ecological Monitoring Investigation of the Estuary, Honeywell discussed the "scatterplot" approach of dose-response relationships advocated by National Oceanic and Atmospheric Administration (NOAA) Coastal Resource Coordinator, Dr. Tom Dillon, and the AET approach. It identified the weaknesses of both approaches, explaining that "In the scatterplot approach, toxicological thresholds are extremely difficult to precisely identify; consequently, only a general range of probable thresholds can be identified. Conversely, the AET approach identifies precise toxicological thresholds, but thresholds that can be substantially influenced by just a few data points." In its October 2006 Ecological Monitoring Investigation for the Estuary, Honeywell, on page seven admitted that "... ranges of ecologically acceptable levels of chemicals in sediment can only be derived by the above-referenced equilibrium portioning approach and 'weight-of-evidence' approach, which includes the AET approach (MacDonald, 1994)." The report went on to say that the "... purpose of employing the AET approach at the LCP Site is to provide a weight-of-evidence assessment for benthos that addresses site-specific ecological conditions in concert with the generically based mean sediment quotient approach. A combination of the two approaches is important since, it is widely recognized that there is no single approach that

accurately measures the biological effects of contaminated sediment. The development of an integrated assessment is of particular value for the LCP Site in that, although chemical analyses and toxicity testing of sediment have clearly indicated the presence of bioavailable and toxic chemicals, causes of the toxicity are subject to different scientific interpretations.”

Dr. Dillon provided similar comments to Honeywell in his August 29, 2008, review of the company’s 2008 Saltmarsh BERA submittal. He criticized the practice of evaluating sediment chemistry using the results from a single year (2006) and comparing those results to a single benchmark, the AET, describing it in Section 1.1 as “...a highly censored approach that yields non-protective estimates of baseline ecological risks to benthic community.” He said that to develop a more accurate risk assessment, site concentrations should be compared to an array of sediment benchmarks representing a continuum of risk, the approach that EPA took to develop Preliminary Remedial Goals (PRGs) for the LCP Site. Dr. Dillon pointed out that between 2000 and 2007, approximately 80% of all mercury concentrations (approximately 300 samples) throughout OU1 exceeded the Florida Department of Environmental Protection’s (FLDEP’s) PEL, which is the lower limit of the range of contaminant concentrations that are usually or always associated with adverse biological effects on benthic biota. EPA’s PRG is based on risks to fish and piscivorous mammals. Dr. Dillon therefore concluded that since the site-specific AET for mercury is an order of magnitude higher than both Florida’s PEL and EPA’s PRG for mercury, reliance solely on the AET could lead to nonprotective risk estimates for benthic biota and for fish and piscivorous mammals.

Honeywell itself, on page four of its October 27, 2008, response to Dr. Dillon’s comments, agreed, stating that, “...generic sediment benchmarks, as well as site-specific AETs, should be compared to concentrations of COPCs in sediment.”

EPA also repeatedly expressed its concern about sole reliance on a site-specific AET to develop a RGO for Aroclor 1268. In EPA Ecological Risk Assessor Dr. Sharon Thoms’ 2007 comments on Honeywell’s 2006 Ecological Monitoring Investigation for the Estuary, she noted that, although one laboratory detected no toxicity in two sediment samples from Eastern Creek, a second laboratory detected toxicity in one of the samples. The bulk sediment concentration of Aroclor 1268 in both samples was below the AET value for Aroclor 1268. She concluded that the elevated pore water concentrations above the Nationally Recommended Water Quality Criterion for PCBs detected in both samples by the second laboratory suggested that the site-specific AET might not be sufficiently protective and recommended that Honeywell use literature-derived toxicity information about PCBs to supplement the site-specific Aroclor 1268 AET presented in the report.

In his August 29, 2008, review of Honeywell’s 2008 LCP Saltmarsh BERA, Dr. Dillon noted that the site-specific AET for Aroclor 1268 (43 milligrams per kilogram, mg/kg) was two orders of magnitude greater than the FLDEP PEL and an order of magnitude greater than the Aroclor 1268-specific PEL of 2 mg/kg.

Although the above discussion focuses primarily on mercury and Aroclor 1268, EPA has concluded that the sole reliance on the AETs for metals is also inadequate for the same

reasons. EPA's decision to use additional sediment benchmarks to assess risk and develop RGOs has resulted in substantial changes to the document (particularly Sections 4 and 7) that now replace previous specific numerical values and interpretations.

b. Data Flaws

In his August letter, Mr. Sowatzka reiterated Honeywell's concern that EPA relied on a too limited data set in Section 4.3.2.3(a) to draw its conclusions about the effect of potential confounding interactions between concentrations of COPC, organic carbon, sulfides, grain size and other factors. However, Honeywell based its evaluation of the revised section solely on statistical tests that grouped all 22 Site samples from the 2006 amphipod study together. Honeywell considered only concentrations of COPCs and grain size, neglecting to consider organic carbon and sulfides in its evaluation.

Even though it is a common practice to compare Site stations to reference stations, in this 2006 study, comparison to the Troup Creek Reference Station was not appropriate. The Troup Creek reference sediment was observed to be toxic for both survival rate and reproductive response relative to laboratory controls. EPA does agree, though, that both known and unknown factors contributed to the amphipod responses.

Honeywell's assertion that the AET procedure accurately explained 87.1% of the observed amphipod toxicity is false. The percentage referred to in the August letter and in Honeywell's 2009 BERA erroneously included ecological effect values (EEVs) for antimony, arsenic, and chromium. To clarify the issues raised, EPA expanded the interpretation of Honeywell's 2006 study discussion, including additional data from Honeywell's data base in an attempt to ascertain potential causes of toxicity at each specific station. The new Appendix D provides specific details with respect to sample specific exposure response relationships and overall accuracies.

Mr. Sowatzka also characterized the information in Table 61 as the basis for EPA's ultimate selection of RGOs for benthic receptors. He argued that the information in the table documents the lack of concentration-response trends for all primary COPCs, particularly mercury and Arocolor 1268. As a result of this and other concerns, EPA has made substantial additions to the interpretation of amphipod and grass shrimp exposure to sediment and effects in the BERA through the use of multiple metrics for identifying potential sediment effect concentrations. Based on the additional evaluations, new RGO ranges for protection of the benthic community have been developed. The multiple metrics approach to amphipods and grass shrimp provides a more robust evaluation of exposure and effects than Honeywell's reliance on the AET for amphipods.

c. 2006 AET Study Design and Interpretation

As you know, this Site has been the subject of numerous monitoring investigations since 2000, voluntarily planned and conducted by Honeywell. Portions of the BERA for OU1 have undergone numerous revisions which reflect these investigations. Although Honeywell submitted several work plans and annual reports to EPA, it is important to note that the

Agency only informally reviewed them, expecting that a detailed analysis of all the data would be presented in the BERA. In fact, EPA did not have enough time to conduct even a cursory review of the 2006 Work Plan. As indicated in the September 20, 2006, email from Dr. Curt Rose to Dr. Thoms, Honeywell informed EPA that it planned to conduct the field work from October 16 - 27, 2006, but did not provide the Agency with a copy of the work plan until the first part of October.

The above comment notwithstanding, EPA is not criticizing Honeywell's analytical testing program. As you know, the 2006 monitoring study work plan only covered sampling collection, not sampling interpretation. As has been frequently discussed, the Agency is concerned, based on its interpretation of the sediment and toxicity test results, that there appear to be other factors, besides the COPC and metals, which contributed to the numerous toxic responses below the AETs. Many of the AET samples demonstrated toxicity above and below 5.5 mg/kg mercury. This is not a flaw, but a fact. As discussed above, the AET approach alone does not address this concern. The revised EPA BERA employed additional methodologies to identify other potential sediment effect concentrations based on exposure (sediment concentrations) and response (toxicity) data.

While EPA did request that Honeywell add metals as additional target analytes in the AET Study after some sampling had already occurred, the extra work permitted the parties to get a better understanding of the causes of laboratory-based toxicity of surface sediment from the Site, particularly with respect to the relative contribution of metals to sediment toxicity. As a result, EPA was able to evaluate the potential roles of other metals, as single compounds and mixtures, in causing toxicities that were not assessed by the AET approach.

Honeywell did, generally follow the standard EPA test method (EPA-600/R-01/020) in 2006, except that only one replicate (one set of 20 organisms) was used instead of five replicates, as prescribed by the test method and as adhered to in the annual toxicity monitoring program. Thus, in 2006, Honeywell did not follow the method.

EPA identified an error on Table 18 of the 2006 Ecological Monitoring Investigation Report, which was included as Table 22 in the 2009 BERA, submitted by Honeywell. The AET for amphipod reproduction for Aroclor 1268 was erroneously reported as 44 mg/kg, when it was actually 28 mg/kg.

To determine whether the toxicological responses of amphipods were statistically significant, the responses of amphipods exposed to Site sediment were compared to responses of control organisms. The comparison was performed according to the procedure explained in footnote "b" on Table 18. Control organisms, which were evaluated with 10 replicates of 20 organisms each, generated the following statistics: (1) mean survival = 97.5% with a lower limit of the 60% confidence interval (CI) at 96.4%; (2) mean growth (i.e. weight) = 0.444 mg (dry weight) with a lower 60% CI of 0.418 mg; and (3) mean reproductive response (i.e., one half the number of observed juveniles divided by the number of females) = 1.836 with a lower 60% CI of 1.55.

Stations EC25 and EC44 on Table 18 of the 2006 Ecological Monitoring Investigation Report were erroneously classified as non-toxic. However, both stations had reproductive responses less than or equal to 1.55. The reproductive response at Station EC25 was 1.375 (22 juveniles and eight females), and the reproductive response at Station EC44 was 1.0 (22 juveniles and 11 females). The correct AET for Aroclor 1268 is the next highest concentration which was from a non-toxic station, Station EC42 with 28 mg/kg of Aroclor 1268. EPA has revised Table 4-19a accordingly.

d. EPA's "Not to Exceed" Criterion for Benthic RGO Values

After carefully considering Honeywell's concerns about applying the "not to exceed" criteria to derive the benthos RGOs in Section 7.3.2, EPA has removed the language from the BERA. However, the Agency expects to assess the full range of benthic RGOs in the Feasibility Study (FS) in order to develop appropriate remedial alternatives. After the FS analysis, EPA intends to include "not to exceed" language similar to the following in the Record of Decision (ROD).

"To protect the benthic community, the average concentration in the bioactive zone of sediment within a circle of diameter of _____ feet in the marsh shall not exceed _____ mg/kg. The average concentration in the bioactive zone of sediment within a linear distance of _____ feet along the creek shall not exceed _____ mg/kg."

Including such language in the ROD will permit Honeywell to evaluate isolated areas which may have contamination above the RGO range, in order to protect the benthic community and to collect additional samples, if necessary.

2. Response to Additional August 10, 2010 Comments

Following the August 10, 2010, meeting with Honeywell representatives, EPA confirmed with the Georgia Wildlife Resources Division's Nongame Conservation Section that there is no record of any wood stork rookeries located at or near the Site. While a reference to observations of the wood stork foraging in the tidal creeks of the salt marsh and breeding at several colonies in the vicinity of Brunswick remains in the BERA, any reference to a wood stork rookery have been removed. In addition, references to the bald eagle, no longer on the endangered species list, have also been removed.

3. Response to September 10, 2010 comments

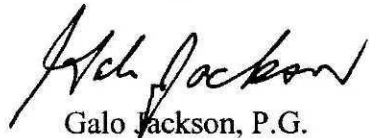
I am enclosing a table which summarizes EPA's responses to specific questions or comments included in Mr. Sowetzka's September 10, 2010, letter to EPA.

4. Conclusion

On July 2, 2010, EPA officially notified Honeywell that it disapproved the company's June 2009 draft BERA for OU1 and that it modified the submission to cure its deficiencies. On August 30, 2010, EPA agreed to extend the deadline for Honeywell to submit formal

notice to dispute that decision until 14 days after receipt of the Agency's response to Honeywell's comments and/or questions about the modified BERA. EPA is hereby transmitting its final responses, as well as a copy of the final BERA.

Sincerely,

A handwritten signature in black ink, appearing to read "Galo Jackson". The signature is written in a cursive, somewhat stylized font.

Galo Jackson, P.G.
Remedial Project Manager
Superfund Remedial Branch

Enclosures

cc: Mr. Jim McNamara
Manager, Land Disposal Unit, Georgia Environmental Protection Division

Significant Items Identified in the Baseline Ecological Risk Assessment (BERA) for LCP Statuary

Section of Document		Recommended Changes
Title	Page/Paragraph/ Line (or other)	
Summary	S-7/8/2	Changed as recommended
	S-8/6/4	
	S-10/3/7	Summary text changed with new results
	S-10/3/8	
Section 4 (Ecological Exposure and Effect Evaluation)	32/5/1-2	Changed as recommended
	33/2/4	
	41/3/2	
	43/1/4-5	Added
	43/4/4	Changed as recommended
	43/4/5	
	43/5/2	
	43/6/7	Text and tables have been revised
	43/6/7	
	43/6/9	
	43/7/2	
	42/7/3	
	44/3/7	Changed as Recommended
	45/5/2-3	
Section 5 (Risk Characterization)	50/4/2	Changed as recommended
	50/7/2	Section has been reorganized and rephrased
	51/2/1	
	51/3/3-4	Changed as recommended
Section 6 (Uncertainty Analysis)	53/4/2-3	Changed as recommended
	53/6/2-5	
Section 7 (Development of Ecologically Protective Media Concentrations)	64/3/2	Changed as recommended
	65/2/6	Text and figure has been revised
	65/5	
	66/3/8	Changed as recommended
	66/4/2	
Tables	Table 2	Changed as recommended
	Table 3	
	Table 4	
	Table 7b	Table has been revised
	Table 10b	Changed as recommended
	Table 11	
	Table 30	
	Table 31	
	Table 32	
Table 48	Checked as recommended and added appendix tables	
Appendix A	Footnote a	Changed as recommended
Appendix B	1/3/1	Changed as recommended
	Table 1	
Appendix F	Fish text	Appendix has been revised accordingly
	Fish text; 1/7/3	
	Fish text; 1/8/2	
	Wildlife Tables	
Appendix G	Table & Table 2	Corrected

Minor Items Identified in the Baseline Ecological Risk Assessment (BERA) for LCP Statuary

Section of Document		Recommended Changes
Title	Page/Paragraph/ Line (or other)	
List of Acronyms, Abbreviations, and Definititons	X	Changed as recommended
List of Figures	Titles	
List of Tables	Titles	
List of Appendices	Titles	
Summary	S-2/ 6-7/2-2 (and throughout document)	Changed as recommended
	S-2/2/2	
	S-3/4/8	
	S-5/3/3	
	S-5/4/3	
	S-6/6/3-4	
	S-8/5/2	No change - to be consistent with most scientific literature avoiding "fishes"
	S-8/5/2 (and throughout document)	
	S-9/2/4	Changed as recommended
	S-9/3/3	
S-10/3/8		
Section 3 (Problem Formulation)	6/6/4	Changed as recommended
	7/1	No change - names still commonly in use
	9/4/1	Changed as recommended
	14/3/4	
Section 4 (Ecological Exposure and Effect Evaluation)	18/4/4	Changed as recommended
	19/1/3	
	19/1/3	
	19/1/5-6	
	19/6/2	
	20/1/7	
	20/1/8	
	20/5/3	Phrases no longer occur
	20/5/6	
	21/2/1	Changed as recommended
	25/6/2	
	32/5/7	
	43/4/2-3	Tables added
	43/5/1	Phrase no longer occurs
	43/6/1	Changed as recommended
	44/1/3	
44/3/3		
Section 5 (Risk Characterization)	47/4	Figures no longer included
	49/1/3-4	Changed as recommended
	49/4/3-4	Changed to eliminate "most clearly"
	51/2/3	Changed as recommended

Minor Items Identified in the Baseline Ecological Risk Assessment (BERA) for LCP Statuary

Section of Document		Recommended Changes
Title	Page/Paragraph/ Line (or other)	
Section 6 (Uncertainty Analysis)	54/4/2	Changed as recommended
Section 7 (Development of Ecologically Protective Media Concentrations)	66/2/2	Changed as recommended
	66/4/1	
	66/4/3	
	67/2/5	
Figures	Figure 4	Changed as recommended
	Figure 5	
	Figure 6	
	Figure 14	
	Figure 18	
Tables	Refer to above comment regarding "List of Tables". In particular, capital letters are frequently inappropriately employed in titles of tables and footnotets are inconsistently identified (sometimes with and without letter).	
	Table 7b	Changed as recommended
	Table 9	
Appendix I	Many Tables	Appendix re-named and re-organized
Appendix J	Title & Text	Title changed as recommended