



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8960

Ref: 4WD-SRB

FEB 29 2012

Via Delivery as Email-attachment to Prashant.gupta@honeywell.com and Certified Mail

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

Re: *Notice of Disapproval of December 2011 Draft of the Remedial Investigation Report, Operable Unit 1-Estuary: LCP Chemicals National Priorities List Site, Brunswick, Glynn County, GA*

Dear Mr. Gupta:

The purpose of this letter is to notify Honeywell International, Inc. (Honeywell) that the U.S. Environmental Protection Agency is hereby disapproving the company's December 2011 draft Remedial Investigation (RI) Report (RI Report) submitted for the LCP Estuary, designated as Operable Unit 1 (OU1) of the LCP Chemicals Superfund Site. Pursuant to Section VIII of the Administrative Order on Consent for the Remedial Investigation/Feasibility Study, Docket No. 95-17-C (RI/FS AOC), the EPA is directing Honeywell to cure the deficiencies, as described below, and resubmit the revised draft RI Report for OU1 to EPA for approval within forty five (45) calendar days of receipt of this letter. As required by the RI/FS AOC, please send the revised document in modifiable electronic format, as well as in hard-copy format. Finally, note that, pursuant to the RI/FS AOC, once the EPA approves or modifies a deliverable or portion thereof, Honeywell may not alter or amend such deliverable or portion unless directed by the EPA to so do.

General Comments

While it is recognized that there is adequate definition of the most highly contaminated portion of the Estuary, the full horizontal extent of contamination has not been defined. Therefore Section 6.3, Concentration Distribution (extent)..., should be renamed with "extent" being removed. An additional section should be included that discusses this deficiency.

Section 7 does not contain an adequate discussion of the hydrogeologic conceptual Site model, especially regarding the sources of contamination and their relative contributions to contamination, nor does it contain a discussion of a mechanism for deep sediment contamination. This deficiency is demonstrated across the report.



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Specific Comments

Page 5, Section 3.1, last paragraph

There is no "GAEPD...regulatory definition of industrial property." However, the Rules for Hazardous Site Response, at 391-3-19-.02(2)(i), define "Non-residential property." Please revise the text.

Page 5, Section 3.2.1, General Setting, 1st paragraph

Georgia EPD should be abbreviated consistently within the report, as GAEPD.

Page 6, Section 3.2.2, last paragraph

Temmerman et al., 2004 is not listed in Section 9, References. Please add the reference.

Page 9, Section 3.3.1

It is stated in the section that "*The sulfur content is 2 to 3 percent and a strong hydrogen sulfide odor is noticeable when the soil is disturbed.*" Presumably this is a direct quote from Rigdon & Green (1980), rather than based on site-specific data. The sulfur content appears high relative to the 27 samples in the Baseline Ecological Risk Assessment (BERA) database. Sulfide (the likely dominant sulfur form in the Estuary) ranged from <0.5 mg/kg to 1,230 mg/kg with a mean of 272 mg/kg. These values are not within the percent range. Also, there is no mention in this RIR report of strong hydrogen sulfide odor from field records. Please revise the paragraph to clarify that the Bohicket soils, as generally characterized by Rigdon & Green, may not necessarily be widespread throughout the LCP Estuary.

Page 9, Section 3.3.2, last sentence of the first paragraph

It is stated in the section that the "*...fairly significant iron oxide concentrations may play a role in sequestering site-specific metallic contaminants.*" However, no specific information is provided as to how such levels of iron oxide may sequester mercury and lead in the LCP Estuary. It appears that the purpose of this sentence is to modify the conclusions reached in the risk assessment reports related to the bioavailability of contaminants. For this reason, unless it can be justified, this sentence should be removed from this document.

In addition, this section indicates that the marsh clay is not continuous everywhere as an obstruction to groundwater flow. The thermal infrared (IR) survey also showed groundwater discharge throughout the extent of the marsh. Please revise the section to indicate that the marsh clay is variable in its capacity to "obstruct" groundwater flow based on the peeper results and the thermal IR survey. Interestingly, seep location 11D (deep) had a mercury concentration of 6.0 micrograms per liter (ug/L) and the 11S (shallow) mercury concentration is 0.74 ug/L. The pH at this location also shows greater impact with depth, with 11S having a pH of 7.84 and 11D a pH of 8.54 standard units. The higher mercury concentrations and elevated pH at depth indicate groundwater discharge.

Tables 3-1 through 3-3

The data for the sampling stations shown on the tables are not in the BERA database, nor in Appendix Table B-16. Please provide a map of where they are located. The associated text discussion in Section 3.3.2 regarding total organic carbon (TOC) should be expanded to include statistics from the BERA database.

Page 10, Section 3.3.4, first paragraph

Change Figure 3-6 to Figure 3-3 and change Figure 3-7 to 3-4.

Second paragraph: Figure 3-7 is missing from both the paper and electronic versions and it presents key information. From the drawings of the *Stratigraphic Cross Sections of the LCP Marsh* it appears that the marsh clay is not continuous. Certainly the thermal IR photography indicated areas of discharge from groundwater to surface water. Please modify the conceptual site model shown on Figure 3.2 with a note stating that the "marsh clay texture is variable and the thermal IR photography indicates discharge into the marsh

Page 10, Section 3.3.4, second paragraph

The text reads that the stratigraphic profile, as depicted in Drawing 1, is rather consistent across the entire region of investigation. This may not be true near the Purvis Creek area. The larger channels (creeks) that cut through the Estuary marsh may often have much different substrate characteristics, e.g., more sandy lenses than clay. Additional information to support the regional consistency hypothesis should be provided.

Page 15, Section 4.4 Vertical Distribution of COCs in Sediment

The statement asserting that profile concentration decreases with depth is an overstatement and should be modified. In Appendix A1, about 40% of the profiles show increases or no decrease with depth. Since only a small percentage of the marsh sediment samples were collected below one foot, this statement should be strongly qualified and expressed within a statistical framework. Further, some of the highest concentrations of contaminants were found in samples collected below the one foot depth. For example, in sediment samples analyzed for lead, the six highest values were collected below the one foot depth, which is especially significant considering that only 4% of the samples were collected deeper than one foot.

Page 21, Section 7, Chemical Transport and Fate

The conceptual site model and discussion of fate and transport emphasized transport of water by tidal cycles but did not fully describe the transport of sediments. The contaminants of potential concern are tightly bound to sediment particles and migrate with suspended sediments. Sediment dispersal and gradual burial are processes that affect the long-term fate of contaminants in the Estuary. The report should be expanded on this point to provide a discussion of fate and transport of sediment-bound contaminants under typical conditions. The RI Report must also describe the potential stability of the sediments in response to storms.

A large database of grain size is available. However, maps showing the variation in grain sizes over the Site were not provided to inform and refine conceptual models of sediment fate and transport. Please provide maps of sediment grain size.

The fate and transport section should include a discussion of mercury methylation and chemical parameters it depends on. Processes affecting mercury methylation at the Site should be described.

Page 21, Section 7.2.1, first sentence

“The nature and extent of contamination within the LCP marsh today can be attributed to conditions and practices in the upland setting of the Site with the various past industrial operations.” The intent of this sentence is not clear. Past industrial operations did contaminate the soils and groundwater at the Site, but impacts are ongoing because these sources have not been removed, especially contaminated groundwater. Also, runoff and leaching from contaminated soils is adding to sediment contaminant levels. This statement should be clarified.

Page 22, Section 7.2.1

Historical Releases During the Manufacturing Era from Process and Storm Sewer Discharges: In the second to the last sentence of the first incomplete paragraph, please insert the phrase “*Some of the...*” to precede “(M)ercury and Aroclor-1268 chemical contribution...” There are other contributions besides the outfall pond/storm sewer line. For example, groundwater contamination was likely already present, and that discharge also provides a contribution as a “release.”

Page 22, Section 7.2.2, last sentence

The EPA does not concur with the statement, “...upland soil sources were addressed during the uplands removal action completed in 1997.” Although significant source removal occurred during the late 1990s Removal Action, it is clear, based on post-removal sampling, that all contamination was not removed. In particular, high levels of contamination remain in the former Cell Buildings Area. Please modify the text to reflect this.

Page 23, Section 7.2.4, 2nd paragraph

Sufficient contaminant attenuation is not occurring everywhere, since the peeper results indicate that contamination is discharging to the marsh in locations 10 and 11. The Georgia Ambient Water Quality Criteria (AWQC) for mercury is 0.025 ug/L and the concentrations are 0.87ug/L in seep 10S, 0.74 ug/L in 11S and 6 ug/L in 11D. Attenuation is occurring, but not sufficiently in those locations to reduce the concentration to the AWQC. Indeed, in the next paragraph, migration through the marsh clay is mentioned. Providing the clay hydraulic conductivity is useful and should be qualified by stating that there are various soil/sediment textures represented in the marsh clay and in some instances the marsh clay is a sandy clay or a silty clay as stated earlier in this RI Report. The fact that discharge is occurring means that in some locations there are lithologic windows from the aquifer to the marsh. Lead concentrations in seeps 11S and D

were 442 and 81.4 ug/L, respectively. Please include the peeper data, with a comparison to the AWQC for each analyte. A cursory review of the peeper results shows that mercury, lead, chromium, arsenic, and others all have concentrations in the peepers that exceed their respective maximum contaminant levels (MCLs) and would thus most likely also exceed the AWQC.

Page 23, Section 7.2.4, Second paragraph, last sentence

The text mentions that "*...transport is likely attenuated by dense rich clay sediments along the marsh.*" To what extent are the contaminants of potential concern (COPCs) presumably attenuated? Please add a discussion as to the expected extent of attenuation of mercury and Aroclor-1268 from the observed seeps.

Page 23, Section 7.2.4, 3rd paragraph

As detailed immediately above, the EPA does not concur with the statement, "Results of the peeper sampling show that the clay serves to attenuate chemical transport to the extent that this pathway is judged to be nominal with respect to COC contribution to the marsh." A full data report on the "Peeper Study" has not been provided for review to the EPA or GAEPD. Two electronic files with the data were made available after the peeper sampling results were available. Further, based on a review of the preliminary results of the Peeper Study and related data from lysimeters, as well as visual observations, upwelling groundwater clearly is resulting in sediment contamination, though the impacts have not been quantified.

The influence of ebb tides in combination with the upward hydraulic gradient should be discussed particular in relation to the creeks, even though conductivity is low in the marsh. Also, regarding Figure 7-2, the removal area boundary should be shown on the figure to help place the seep locations in perspective.

Page 23, Section 7.3

Correct the spelling of Model. This section should provide a discussion that attempts to explain the spatial distribution and transport of mercury and Aroclor 1268 concentrations in the sediment, particularly why there are several elevated areas in North Purvis Creek. Is it all due to erosion and transport by tidal action? In addition, a discussion of sediment transport (e.g., re-suspension) and biological transport of contaminants in the Estuary should be presented.

Page 24, Section 7.3, first paragraph

The text refers to Figure 7-3 as a conceptual model of hydrodynamics and effects. However, the figure only depicts tidally-influenced flow directions, and does not promote an understanding of COPC distributions. Please revise the figure or the text to better portray hydrodynamics and effects.

Page 24, Section 7.3, final paragraph

Figures 6-1A and B show the mercury and Aroclor 1268 concentration distribution. The figures

indicate that sediment concentrations are high in two tributaries. Slough blocks (referred to in the RI Report starting on page 17) may contribute to this contaminant distribution, but discharge from seeps (seep 10 and 11) indicates that seeps also contribute to the contaminant load. A figure with the peepers, seeps and sediment samples, along with their mercury and Aroclor 1268 concentrations, would be helpful.

Page 24, Section 7.4

This section should discuss some of the other factors relevant to the fate of mercury and Aroclor 1268 and that contributed to the major uncertainties and poor predictability of understanding these constituents in the environment. Rather than simply mentioning TOC, pH, ORP, clay content, particle size, and sulfides as being potentially significant to understanding fate/transport, a more detailed analysis should be presented. Also, a key component of mercury fate/transport in the LCP Estuary is methylation, yet there is no discussion. Please describe how methylation of mercury in Estuary sediments occurs and its fate through the local food web.

In addition, the discussion contained in this section is not sufficient to support the statement that tidal redistribution is responsible for the re-contamination of the marsh. Section 7.2.1 states that marsh contamination is the result of past operations. Since it appears that there are multiple sources of contamination to the marsh, the final sentence in the section should be removed or qualified.

Page 25, Sections 7.4.1 and 7.4.2

These sections discuss “evaluation of metals (mercury and lead) fate via a (sic) SEP.” For clarity, and to differentiate the work presented in the referenced document MWH Americas 2005 from the SEP used in the leachability study, it is recommended that this SEP be referred to by its name, AVS-SEM (Acid Volatile Sulfides – Simultaneously Extracted Metals). Further, information presented in MWH Americas 2005 indicated that this method, although applicable to lead, is not appropriate for evaluation of mercury. This was verified during the ITRC webinar, "Incorporating Bioavailability Considerations into the Evaluation of Contaminated Sediment Sites," held January 26, 2012. Consequently, Section 7.4.1 should be deleted in its entirety.

Metal contaminants, which may be strongly bound, can become liberated as sediments are re-suspended by tidal currents or biota. Re-suspension can have a temporary effect on the redox potential when contacting oxygenated waters, allowing metals bound to iron oxides and sulfides to be released. The SEP results do not indicate a lesser degree of bioavailability of metals in OU1 sediments relative to what one would expect for estuarine sediments. The widespread distribution of mercury and Aroclor 1268 in OU1 attests to contaminant mobility in the Estuary. Please enhance the discussion of chemical fate and transport.

Page 25, Section 7.4.1, last sentence

The Kaplan et al., 2002 citation should be added to the reference list.

Page 27, Section 8

In addition to discussing the identified potential receptors and the potential that these receptors may be exposed to site-related contaminants, please add a conceptual site model for risk.

Page 28, Section 8.2.1, 2nd bullet, 1st sentence

Please revise the bullet as follow, "...a set of hypothetical receptor scenarios..." to read "...a set of current and/or hypothetical receptor scenarios..."

Page 29, Table

- a. Manganese should be identified as a COPC for the marsh trespasser exposure to sediment.
- b. An additional footnote should be added stating all chromium in sediment and biota was chemically assessed as hexavalent chromium.
- c. For footnote [3], although mercury and methylmercury were considered separately for sediment exposure in the HHBRA, it should also be noted that both chemical forms were assessed as methylmercury.

Page 30, Section 8.2.3.2.1, marsh trespasser

While the input values are correct based on the human health risk assessment (HHRA), the text here describing this receptor does not reflect the EPA's recollection of the discussions that resulted in the exposure frequency that was assumed for this scenario. For the sentence that begins "It is a difficult place to negotiate on foot...", please revise this sentence to read "It is difficult in some areas of the marsh for humans to negotiate on foot due to very soft sediment that can result in rapid sinking; therefore the HHBRA only used data points from samples collected in more accessible areas."

For the sentence that begins "EPA does not have default exposure factors for marsh trespasser scenarios and risk assessment from EPA Region 4...", please revise to "EPA does not have default exposure factors for marsh human site visitor or trespasser scenarios; thus site-specific judgment was used to estimate appropriate exposure inputs that would not underestimate the risks." Please omit the sentence that begins "Nevertheless, this scenario was evaluated..."

Page 32, Section 8.2.4-toxicity values for Aroclor 1268

In the 5th paragraph, the 2nd sentence that begins "There are data that suggest that Aroclor-1268...", please revise to read "EPA recommends assessing total PCBs using CSFs based on toxicology studies done with several Aroclors. The RfDs for Aroclor 1254 and/or Aroclor 1016 are commonly used to assess non-cancer endpoints for other Aroclors." The discussion of other studies not used by IRIS (Simon *et al.*, 2007; Warren *et al.*, 2004) should be discussed only in the Uncertainty Section (Section 8.2.6).

In the 6th paragraph, the 2nd sentence that begins “For the OU1 HHBRA, EPA required the use...”, please revise this sentence to “For human ingestion of PCBs in biota and soil/sediment, IRIS recommends the use of the ‘high risk/persistence’ CSF value for estimation of potential carcinogenic risks.”

Page 32, Section 8.2.4

Lead does not have a CSF or RD; a discussion of how lead risk was evaluated must be included.

Page 33, Section 8.2.5.1 (1st paragraph of section)

The text that reads “These estimates do not reflect an individual’s overall lifetime risk of developing cancer, which is actually between...” should be re-worded to, “These estimates do not reflect an individual’s existing lifetime risk of developing cancer, which is, without site exposure, already between...”

The text that reads “Tables 8 and 9 of the OU1 HHBRA detail the ELCR estimates...” is not in agreement with the August 2011 version of the HHBRA which has ELCR in Table 8 but not Table 9.

Page 34, Section 8.2.5.2, last paragraph of section

The text that reads “Tables 8 and 9 of the OU1 HHBRA detail the HQ/HI estimates...” is not in agreement with the August 2011 version of the HHBRA which has HQ/HI in Table 9 but not Table 8.

Pg 34, footnote 1

“This table is a reproduction of Table 23 of the OUI HHBRA Report.” The August 2011 HHBRA has the Summary of Risk Estimates in Table 22.

Section 8.2.6 Characterization of Uncertainties

In line 12 of the section the text reads, “...it results in an overestimation of risks...” – please revise to read “...it results in a conservative estimation of risks...” In the 3rd bullet: “The assumption that a hunter would eat clapper rail obtained exclusively from the LCP marsh and that clapper rail comprises 10% of the wild game he eats...” - please revise to read “The assumption that a hunter would eat clapper rail obtained from the LCP marsh such that this source of clapper rail comprises 10% of the wild game he eats...”

In the last bullet: “...Aroclor 1268 should be evaluated using the upper-bound CSF for high risk/persistence PCBs such as Aroclor-1254, when scientific evidence suggests that its tumorigenic potency is at least 10-times lower...” - please revise to read “...Aroclor 1268 should be evaluated using the upper-bound CSF for high risk/persistence PCBs such as Aroclor-1254, when one scientific publication suggests that the tumorigenic potency of Aroclor 1268 may be at least 10-times lower...” In the first line after the 4th bullet”: “The consistent use of

highly conservative assumptions...” – Please omit the word “highly” as this descriptor is inconsistent with the Reasonable Maximum Exposure approach used in the HHBRA.

Page 36, Section 8.3.1, 3rd paragraph, 1st sentence

This sentence should be modified from “Honeywell subsequently proposed to conduct...” to “Honeywell subsequently conducted a ...”

Page 37, Section 8.3.2, 3rd paragraph, 1st bullet

The last sentence is incorrect and must be revised. Marsh grass has not filled in the removal area; it is mostly bare currently.

Page 37, Section 8.3.2, first paragraph, last sentence

It is stated that there was no equivalent evaluation of COPC concentration trends in biota, relative to the trend analysis given to sediment. Although the BERA text did not provide a detailed analysis of concentration trends in biota, the data presented in BERA Tables 4-8b, 4-9b, 4-10b, and 4-11b do not show temporal trends. This language was also used in Honeywell's 2009 BERA version. Furthermore, this sentence conflicts with Section 8.3.4.2, third sentence. Please delete the last part of the sentence after the comma.

Page 42, Section 8.3.4.6. Studies of the Benthic Community

The sentence in the last paragraph on Page 42 is inaccurate. The sentence states that a preliminary study of fiddler crabs at the AB Seep found fiddler crabs there to be present in numbers that might be expected to occur in a relatively pristine marsh. The paragraph should be revised to reflect the wording in the BERA. The text on Page 44 pertaining to the fiddler crabs more accurately reflects the BERA. The text on Page 44 describes the study as preliminary, unreplicated, and without quantification of tissue concentrations. The sentence on Page 44 should be moved to the paragraph on Page 42. The fiddler crab study should not be mentioned on Page 44 because it was inconclusive. The density of fiddler crabs at the AB Seep (200 per square meter) was within range of densities reported for salt marsh habitats by authors referenced by Hoffman et al. 1986, who reported densities to range from 80 to 400 burrows per square meter. Densities cited by George et al. (2010) were up to 260 adults per square meter and 120 juveniles per square meter. The density of fiddler crabs was substantially higher at the AB Seep at LCP than elsewhere in OUI. The composition of the benthic community was dominated by pollution tolerant polychaetes, which suggests an unhealthy benthic community overall. The comparison of one data point for one location in the marsh with one literature reference is insufficient to support a statement in the text that the study “found” something, which suggests a conclusive outcome to the study. Spatial and temporal variability were not taken into account and will confound any comparison based on two data points. Text should be revised.

Page 43, Section 8.3.5.1, 2nd sentence

The sentence should be revised as follows: “...assessment endpoints using one or more measurement...”

Page 44, Section 8.3.5.2, paragraph 5

Remove the sentence "The stations in Purvis Creek and Eastern Creek were not different from the reference locations", as this statement is not supported by the data presented in BERA Table 4-25.

Page 47, Section 8.3.5.9, 3rd bullet, 3rd sentence

The sentence should be revised as follows: "...which these HQs are **based** are generally higher..."

Page 48, Section 8.3.6, Ecological Sediment Remedial Goal Options

Text at the top of Page 48 correctly conveys that the BERA reported the risks to certain groups of receptors as minimal. Remedial goal options were developed for receptor groups exposed to localized areas of contamination in OU1, where risks are of concern. The ecological risk assessment was conducted over large domains within OU1 using average concentrations, which do not reflect localized enrichment of contaminant concentrations. The RGOs were developed in part to examine the distribution of sediments of sufficient concentration to result in risk. Text should clarify that localized areas of concern are present in OU1.

Editorial Comments

In second line of second paragraph on page 37 word "of" missing before "several."

In second sentence in section 8.3.3.3, word or words appear to be missing.

In last sentence on page 39, seems like words missing after "... in surface water and/or ??? included..."

Top of page 40, word missing after "quantitatively..."

In first full sentence on page 40, seems like something missing after "EEVs," probably word or comma.

Period after word "Estuary" at end of page 40.

In third line of section 8.3.5, on page 43, looks like words missing after "...endpoints using..."

In fifth line in the second paragraph on page 44, looks like words missing after "Western Creek Complex,..."

In first full sentence before section 8.3.5.7, word "to" missing before "herbivorous." In second full bullet on page 47, words missing after "HQs" in fourth line.

In first bullet of section 8.3.7, word "of" missing after "...protection" in second to last line.

Is there an "a" missing after the word "between" in the fifth line of the fourth paragraph in section 2.2?

If you have questions regarding the preceding, please contact me at (404) 562-8937.

Sincerely,



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

cc: J. McNamara, GAEPD

REFERENCES

George, S. B.; Carlson, M. D.; and L. B. Regassa. 2010. Shell use by juvenile fiddler crabs *Uca pugnax* and *U. pugilator*. *Journal of Experimental Marine Biology and Ecology* 396 : 35–41.

Hoffman, J. A.; Katz, J.; and M. D. Bertness. 1984. Fiddler crab deposit-feeding and meiofaunal abundance in salt marsh habitats. *Journal of Experimental Marine Biology and Ecology* 82: 161-174.

EPA 1989. *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part A*. Interim Final, EPA OERR, December 1989.

EPA 1991. *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Supplemental Guidance, "Standard Default Exposure Factors"*, Interim Final, OSWER Directive 9285.6-03, March 25, 1991.

IRIS, 2011. Integrated Risk and Information System, National Center for Environmental Assessment, Office of Research & Development, USEPA (website [www.epa.gov/iris], updates added periodically).

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