MEMORANDUM

TO: LISA Humphreys, USACE PBOW Coordinator, and others

FROM: Julie Weatherington-Rice, Ph.D., RAB TAPP Coordinator

RE: Draft Baseline Human Health Risk Assessment and Draft Screening Level Ecological Risk Assessment Work Plans Reservoir No. 2 Burning Ground, Former Plum Brook Ordnance Works, Sandusky, Ohio – JE Jacobs

DATE: May 21, 2009

Per our current contractual arrangement with US ACE which require both a technical memorandum for each report and an educational explanation to the RAB, this memorandum constitutes the technical review of the J E Jacobs March 2009 "Draft Baseline Human Health Risk Assessment and Draft Screening Level Ecological Risk Assessment Work Plans Reservoir No. 2 Burning Ground, Former Plum Brook Ordnance Works, Sandusky, Ohio" documents. Please forward to those who need to read this technical review.

General Comments

These documents, like most of the documents developed for the Plum Brook Ordnance Works (PBOW) site are rift with acronyms and abbreviations. While these documents contain the typical "List of Acronyms and Abbreviations" in the Table of Contents, there are a number of terms that are not in common usage (such as OEPA or VOC) which are easily recognized at this point in the process by the lay reader. I had to check the list to find that "RTE" stood for "rare, threatened, or endangered". While I can appreciate that the authors are so acclimated to writing these types of documents that the use of these less common acronyms and abbreviations are second nature to them that is not the case with the lay reader. All documents for this site, especially the more arcane risk assessments, would greatly benefit from a final edit that replaced the less common acronyms and abbreviations with the actual phrase. This could be achieved simply by using the "Find All" and "Replace All" editing tool in their word processing program. For instance, all locations where the term "RTE" has been entered could be searched and replaced with the actual term "rare, threatened, or endangered". If for some reason, there is a compelling need to keep the abbreviation, the replacement could be "RTE (rare, threatened, or endangered)". I am certain that many readers would appreciate that courtesy.

Since this is simply a rehashing of historical documents, new information, such as the research on the properties of the carbonate bedrock formations under the PBOW site, is not incorporated into the documents. For instance, all of the information presented in

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the Human Health Risk Assessment in Section 1.3.2 "Groundwater Use" resubmits the historic conclusions that the limestone wells in the area of the Reservoir No. 2 Burning Ground are incapable of sufficient yields of ground water for a potable ground water source. In this report, ground water is considered a source of potable water. This section notes the locations of the closest private water wells (page 1-5, 2nd full paragraph) as being 3,800 feet (recorded log - 6115 Schenk Rd.) and 2,250 feet (no well log - 1810 Schenk Rd.) away on Schenk Road exactly as it was referenced in the Acid Area 1 document reviewed last February. A search on Google Earth locates the center of the Reservoir No. 2 Burning Ground at approximately 41^0 22' 27.65" North Latitude and 82^0 42' 06.62" West Longitude which creates a significantly greater distance to the local private water supply wells of approximately 8,388 feet for the 1810 Schenk Rd site. The distance to 6115 Schenk Rd. is approximately 2,850 feet. The SAIC reference must be to the boundary of the property and not to specific locations on the site.

Another limitation to using a "boilerplate" risk assessment document is that it is not clear the last time Jacobs undertook a comprehensive literature review to determine the most current considerations in human health and ecological risk assessments. This review seems to have included several more recent references (two for 2007 related to US EPA's ProUCL statistical program) since the risk assessment work plan prepared for Acid Area 1. I am pleased to see that my earlier comments may have resulted in updating the reference materials for this process. Again, however, it would be extremely helpful if a section was included in these documents that noted the date of the last thorough literature review on these topics.

For some reason, I found the Human Health Risk Assessment harder to follow than usual. Possibly this was because the report evaluated both the burn area and the area outside the burn area. I found it difficult to determine which parameters created risk issues for each human class. For my own understanding, I created the attached two tables, Burn Area – Human Health Risk Assessment Reservoir # 2 Burning Ground (Table # 1) and Outside Burn Area – Human Health Risk Assessment Reservoir # 2 Burning Ground (Table # 2) from sections 7.2.1 *Risk Results for the Burn Area* and 7.2.2 *Outside Burn Area Risk Results*, pages 7-2 through 7-4. I have included them in this memo because I found them a helpful summary. However, I am not absolutely certain that they are completely accurate as I struggled with the language, order of comments, and the limitation of using abbreviations as I worked through these two sections. The sections would be greatly improved if there was a uniform presentation of the order of the parameters and the risk types for each of the human classes evaluated. I am not certain if Indoor Workers have no non-cancer threats from surface soil and ground water in the burn area or if the authors and reviewers simply forgot to list them. They do have a non-cancer risk from ground water in the area outside the burn area.

Specific Comments – Draft Baseline Human Health Risk Assessment Reservoir No. 2 Burning Ground

Page 1-3, Section 1.2 Background, 7th paragraph

1. "Organic concentrations are significantly higher at the location upstream of the site, adjacent to the service road, suggesting that contaminants are related to a source other than the burning ground." Has this/these other source(s) been identified yet? What land uses are upstream of the drainage ditch sampling location, both historical and present, that could be contributing these "organic concentrations'? This statement needs additional clarification and/or documentation to support it.

Pages 2-9 and 2-10, Section 2.3 Results of the Data Evaluation beginning with "Surface Soil Within Burn Area"

2. This section would be helped with a link to a previous document that explains why not every sample was tested for every parameter and/or a short discussion here RE: the reasons for selective testing parameters.

Page 3-2, Section 3.1.1 Physical Setting: Geology, 2nd paragraph

3. "Rock cores collected during the monitoring well installation showed few fractures, low porosity, and occasional zones with naturally occurring oil and hydrogen sulfide gas which are common in the Columbus Limestone (Shaw, 2005b). The Shaw report is incorrect regarding the statement that "hydrogen sulfide gas" is "common in the Columbus Limestone". In point of fact, here in Ohio, hydrogen sulfide gas is typically found emanating from bedrock formations deposited in a reducing atmosphere, such as the black shales. Any hydrogen sulfide gas emanating from a Columbus Limestone well is probably coming from the underlying Detroit River formation which is exposed at the Wagner Limestone Quarry. The gas can move up through bedrock fractures in the overlying Columbus Limestone and vent from the well casing, but the gas does not originate in the Columbus Limestone formation. Please either correct this section and/or remove the incorrect portion of the quotation.

Page 3-3, Section 3.1.1 Physical Setting: Surface Water, 1st paragraph

4. Is there a culvert and/or a field tile under the road to join the two parts of the drainage ditch? If so, which way is it sloping? How do you know?

Page 3-9, Section 3.1.3.4 Subsurface Soil: Future On-Site Resident

5. Don't forget gardening as a land-use activity of the future on-site resident. Vegetables will be grown in the subsurface soil for at least three possible reasons: 1) the subsoil is exposed at the earth's surface because of excavation and construction of the property when building the new residence, 2) the garden plot has been deep tilled and/or double dug, and 3) the vegetable has a deep rooting system. Many vegetables will bioaccumulate metals in the plant tissues which are then eaten by the resident family. See note 6.

Page 6-4, Section 6.0 Uncertainty Analysis: Selection of Hypothetical Receptors and Potential Exposure Pathways, 1st full paragraph

6. "However, experience has shown that risk from ingestion of home-grown grains, fruits, meat, poultry, eggs, or milk is generally insignificant." But NOT green, leafy vegetable parts. In fact, the broccoli family is used for the uptake of heavy metals as a form of phytoremediation on Superfund and Voluntary Action Plan clean-up sites.

Specific Comments – Draft Screening Level Baseline Ecological Risk Assessment Reservoir No. 2 Burning Ground

Page 2-16, Section 2.4.1 Terrestrial Receptors, top of page

7. "For the deer and hawk, the area use factor was set at 0.02 (2%) and 0.01 (1%), respectively, based on these two species' relatively large home ranges (518 and 842 hectares, or 1,280 and 2,081 acres, respectively), compared with the size of the site (25 acres)." There is a serious problem with using this approach of screening each site separately at PBOW. While it is true that this site is only 25 acres, it is NOT the only 25 acres that are contaminated at PBOW. So when a major grazer or hunting bird is screened against just one site, it does not take into consideration the cumulative effects of all of the contaminated sites in that animal's or bird's natural range. To date most, if not all, of the clean-ups have been driven by human health exposure limits. If each clean-up site was placed in the middle or at the edge of a circle encompassing the typical large home ranges of grazing animals and hunting birds, it might be found that the cumulative exposures to all the contaminated locations in their home range resulted in an ecological risk driven clean-up. It would be useful information to try that broader screening approach when new ecological risk assessments are undertaken.

This concludes my technical comments on these Draft Baseline Human Health Risk Assessment and Draft Screening Level Ecological Risk Assessment Work Plans Reservoir No. 2 Burning Ground, Former Plum Brook Ordnance Works, Sandusky, Ohio documents. If you have any questions and/or need further clarification on any point discussed in this memorandum, please feel free to contact me.