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Subject: Final Human Health Risk Assessment and Ecological Risk Assessment Work Plans for Acid Area 1, Former Plum Brook Ordnance Works, Sandusky, Ohio

Dear Kathy,

Comments were received from OEPA regarding the above mentioned document. Responses and change pages have been prepared. Enclosed find four (4) copies each of the response to comments and change pages for insertion . In addition Figure 2-1 should be removed from the final version.

If you have any question please contact me at 865-220-6043 or al.hardesty@jacobs.com.

Sincerely yours,

Al Hardesty

Al Hardesty

Attachments
Cc: Rick Meadows-CELRH (3 copies)
Paul Jayco-OEPA (2 copies)
Janusz Byczkowski-OEPA (1 copy)
Robert Lallier-NASA (1 copy)
Vernon St. John - CENWO (1 copy)
Dennis Druck-USCHPPM (1 copy)
Mark Bohne-PBOW RAB (1 copy)
Julie Weatherington-Rice – TAPP (1 copy)

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in the following sections. Data from the Acid Area 1 site will be presented in tables and discussed in text in the BHHRA report. A CD-ROM of the raw data used in the risk assessment, organized by exposure medium and exposure unit, will be included with the risk assessment report for ease in data manipulation during document review.

2.2.1 Risk-Based Screening

Risk-based screening for human health is introduced to focus the assessment on the chemicals that may contribute significantly to overall risk and to remove from quantification those chemicals whose contribution is clearly inconsequential. In this screening, the maximum detected concentration (MDC) is compared to the appropriate risk-based screening concentration (RBSC). The units of the MDC and RBSC are the same for each chemical in a given medium. The maximum reporting limit for analytes with no reported detections will be compared to the risk-based screening criteria. If the maximum reporting limit exceeds the screening level, the analyte will be retained for qualitative evaluation in the HHRA.

If the MDC of a chemical is less than or equal to its RBSC, then the chemical in this medium is not considered further in the BHHRA because it is unlikely that chemical concentrations at or below the RBSC would contribute significantly to risk. An analyte is identified as a COPC if its MDC exceeds its RBSC. RBSCs used in this BHHRA will be derived from the EPA Regional Screening Levels (EPA, 2009). Region 9 PRGs are not being used for the screening because the Region 9 PRGs are no longer being updated and published. Contaminants that are considered to be related to past activities at the site may be retained as COPCs based on best professional judgment regardless of the results of screening.

RBC values are based on a concentration equal to either an incremental lifetime cancer risk (ILCR) of 1E-6 or a noncancer hazard quotient (HQ) of 1, which is the threshold at (or below) which adverse noncancer effects are regarded as unlikely to occur. For this BHHRA, the noncancer values listed in the RBC tables will be multiplied by a factor of 0.1 to provide additional protection for simultaneous exposure to multiple chemicals (EPA, 2004a and 1995). This will result in RBSC values associated with an HQ of 0.1. For cancer risk, the RBC values will be used directly as RBSCs in the BHHRA because they are based on an ILCR of 1E-6; acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of 1E-6 to 1E-4 (EPA, 1990), referred to as the "risk management range." The OEPA-DERR fixed cumulative human health goals of 1E-5 and HI=1 will be considered during completion of the risk assessment. However, decisions for the site will be based on the EPA risk management range. Cancer risks associated with RBC values represent the lower end of this range. For this BHHRA, the RBSC for a chemical that elicits both cancer and noncancer health effects will be selected based on either a cancer risk of 1E-6 or an HQ of 0.1, whichever associated concentration is lower.

2.2.2 Evaluating Essential Nutrients

Certain elements are essential human nutrients that are generally regarded as innocuous at levels found in environmental media. These include calcium, chloride, iodine, magnesium, phosphorous, potassium, and sodium. There are no Region III RBCs listed for these nutrients. Essential nutrients may be eliminated as COPCs, provided that their presence in a particular medium is shown to be unlikely to cause adverse effects on human health. An exposure

analysis will be performed whereby a daily dose of the essential nutrient from the medium in question is calculated. The dose will be compared with levels known or expected to be safe or toxic, and/or with daily allowances, depending on the availability of data.

2.2.3 Background Screening

Background screening will be applied to each inorganic analyte whose MDC exceeds the RBSC and that cannot be characterized as an infrequently detected analyte. In background screening, the MDC will be compared to the PBOW chemical-specific background screening concentration (BSC). The derivation of groundwater BSCs was described in the 2004 groundwater report (Shaw, 2005b). Groundwater BSCs were calculated for use at PBOW based on concentrations found in background bedrock monitoring wells installed upgradient of PBOW sources. Each groundwater BSC is either the MDC or the calculated 95 percent upper tolerance limit of the background groundwater data set based on unfiltered samples collected using low-flow sampling, whichever value was lower (Shaw, 2005c). BSCs for soil were established as part of the acid areas investigation (IT, 1998). BSCs for soil were reported as the 95 percent upper tolerance limit for lognormal data sets or the 95th percentile for datasets with a nonparametric distribution.

Background screening for inorganic constituents will consist of comparing the MDC of the site data set to the BSC. An inorganic constituent will be considered for further evaluation if its MDC exceeds the BSC; further evaluation may include either statistical population testing (Section 2.2.4) or immediate inclusion as a COPC and subsequent evaluation in the exposure assessment, toxicity assessment, and risk characterization. The chemical will not be regarded as a COPC if its MDC is equal to or less than its BSC.

2.2.4 Statistical Data Set Testing of Inorganics

Statistical testing of site inorganic data against the PBOW background data set (identified in Appendix M of the 2004 groundwater data summary and evaluation report [Shaw, 2005b]) may be performed for chemicals whose MDC exceeds their respective BSCs and are identified as COPCs based on RBSC comparison (Section 2.2.1) and frequency of detection (Section 2.1.4). This will be performed using the nonparametric Wilcoxon Rank-Sum (WRS) statistical test (also known as the Mann-Whitney U test). Site data sets will be interpreted as being significantly different from PBOW background if the associated p-level is less than 0.05. WRS statistical output and box and whisker plots of the various data sets will also be included for any constituent tested. Statistical testing will be performed after the risk characterization as part of the uncertainty analysis. A WRS test will not necessarily be run on all inorganic COPCs. For instance, if a site data set of a given inorganic has obviously greater concentrations than the background data set, then the USACE might choose not to run the WRS. Constituents shown by the WRS results to exceed background (or for which the WRS was not run because of obviously higher concentrations in the site data set) will be assumed to be site related or a qualitative chemical-specific explanation as to why the constituent should not be regarded as site related will be presented in the uncertainty analysis of the BHHRA report.

2.2.5 Treatment of Organics

As mentioned in Section 2.2.3, certain organic compounds (BTEX and PAHs) in site media may be attributable to background conditions. The MDC of PAH and BTEX data may also be compared to BSCs (Section 2.2.3) and may be compared to PBOW background data using WRS (Section 2.2.4), but no organic compound will be summarily screened out. Instead, all detected organic compounds will be carried through the risk assessment process (i.e., exposure assessment, toxicity assessment, risk characterization) unless screened out on the basis of comparison to RBSCs (Section 2.2.1) or is characterized as infrequently detected (Section 2.1.3). A discussion of background contribution of organics will be presented in the uncertainty analysis of the BHHRA report.

2.3 Data Evaluation Summary

A table will be prepared for each medium at Acid Area 1 with the following information for each detected chemical:

- Chemical name,
- Frequency of detection,
- Range of detected concentrations,
- Range of detection limits,
- Arithmetic mean of site concentrations,
- 95th percent upper confidence limit (UCL) on the arithmetic mean (UCL_{95}),
- Appropriate RBSC,
- Appropriate BSC, and
- Selection/exclusion of chemical as a COPC.