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APR 05 1999

Mr. James A. Saric, Remedial Project Manager
U.S. Environmental Protection Agency
Region V-SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

DOE-0603-99

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

RESPONSES TO THE U.S. ENVIRONMENTAL PROTECTION AGENCY AND OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM FOR THE ON-SITE DISPOSAL FACILITY CELL 1 BASELINE GROUNDWATER CONDITIONS (SEPTEMBER 1998)

This letter serves to transmit the enclosed subject response to comments document for your review and approval. Consistent with the comments, the response to comments document includes recommendations for: 1) accepting the Cell 1 baseline established for the Great Miami Aquifer, and; 2) adjusting the baseline monitoring approach used for the horizontal groundwater monitoring wells installed in the glacial till beneath each cell of the On-Site Disposal Facility (OSDF). The recommended adjustments are designed to ensure the independence of perched water samples collected from the glacial till and to provide a more thorough assessment of seasonal variations in perched water quality. The resultant samples will provide a comprehensive data set to support the required statistical analysis.

The proposed path forward for establishing a baseline of perched water quality (discussed in detail in the response to Comment #3 [Ohio Environmental Protection Agency (OEPA) Original Comment #2]), is to extend the duration of the base sampling period (two years proposed) to fully assess seasonal variation in perched water quality beneath the OSDF. During the baseline period, sampling frequency will be maintained on a monthly or bimonthly frequency. This sampling frequency will ensure independence of the samples and provide a sufficient data set for evaluating seasonal variations. This additional data and associated statistical analysis will be presented in a new draft technical memorandum

when the proposed additional sampling and statistical analysis of these samples have been completed. In the interim, sampling results will continue to be provided in the Integrated Environmental Monitoring Plan (IEMP) reports.

Please contact Jay Jalovec at (513) 648-3122 if you have any questions regarding the response to comments.

Sincerely,

Johnny Reising

Johnny W. Reising
Fernald Remedial Action
Project Manager

FEMP:Jalovec

Enclosure

cc w/enclosure:
N. Hallein, EM-42/CLOV
G. Jablonowski, USEPA-V, SRF-5J
R. Beaumier, TPSS/DERR, OEPA-Columbus
T. Schneider, OEPA-Dayton (three copies of enclosure)
F. Bell, ATSDR
M. Schupe, HSI GeoTrans
R. Vandegrift, ODH
F. Barker, Tetra Tech
AR Coordinator, FDF/78

cc w/o enclosure:
J. Reising, OH/FEMP
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D. Carr, FDF/52-2
T. Hagen, FDF/65-2
J. Harmon, FDF/90
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RESPONSES TO U.S. & OEPA COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM FOR THE ON-SITE DISPOSAL FACILITY CELL 1 BASELINE GROUNDWATER CONDITIONS (SEPTEMBER 1998)

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

MARCH 1999

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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RESPONSES TO U.S. EPA COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM FOR THE ON-SITE DISPOSAL FACILITY CELL 1 BASELINE GROUNDWATER CONDITIONS (SEPTEMBER 1998)

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General Comments

1. Commenting Organization: U.S. EPA Commentor: Saric
Section#: 4.1 Pg.#: Line#: Code:
Original Comment# 1

Comment: Section 4.1 states that the baseline data for Cell 1 were not collected over a time period that allows for seasonal variations in groundwater quality. U.S. DOE recommended Cell 1 baseline data be expanded to include groundwater quality results from Cell 2. Use of Cell 2 data to establish the baseline for Cell 1 could result in elevated baseline data because the groundwater quality in Cells 1 and 2 appears to differ based on redesign investigation groundwater sampling results. Specifically, total uranium concentrations in the Cell 1 samples collected from wells 11491 and 11492 ranged from not detected to 3.1 micrograms per liter. Total uranium concentrations in Cell 2 samples from wells 11493 and 11494 ranged from 5.8 to 14.4 micrograms per liter.

To eliminate the compounding effect of both seasonal and location variability in establishing the baseline data for Cell 1, U.S. DOE must continue to collect and analyze groundwater samples from beneath Cell 1 on an annual basis to establish baseline conditions, instead of combining the baseline data sets for Cells 1 and 2.

Response: The U.S. Department of Energy (DOE) agrees that additional sampling is needed to establish baseline for the glacial till beneath Cell 1. The DOE will continue to collect samples from the horizontal till wells every other month, so that seasonal variability can be assessed. Once a sufficient database has been established, a methodology for establishing baseline will be discussed with the agencies prior to preparing another technical memorandum documenting baseline conditions.

Action: DOE will continue to collect samples for Cells 1, 2, and 3 to establish baseline conditions.

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RESPONSES TO OEPA COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM FOR THE ON-SITE DISPOSAL FACILITY CELL 1 BASELINE GROUNDWATER CONDITIONS (SEPTEMBER 1998)

General Comments

2. Commenting Organization: Ohio EPA Commentor: OFFO
Section#: Pg.#: 6-11 Line#: Code:
Original Comment# 1

Comment: Page 6-11 of the OSDF Groundwater/Leak Detection and Leachate Monitoring Plan lists two bulleted items that are not addressed in this Technical Memorandum: the action leakage rate for the LDS and the pump operating level for the LCS.

Response: Comment acknowledged. The DOE believes that the reviewer intended to reference page 6-1 of the plan because there is no page 6-11. The DOE did not intend to suggest that a single technical memorandum would address each of the bulleted items. This technical memorandum was written to address only the baseline groundwater monitoring conditions for the on-site disposal facility Cell 1. The LCS pump operating level has been previously reported in the Leachate Conveyance System Design Package and LDS leakage rates will be included in future IEMP reports.

Action: As noted in the response.

Specific Comments

3. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: N/A Pg.#: N/A Line#: N/A Code: G
Original Comment# 2

Comment: This document should include a detailed description of the technique used for the collection of groundwater samples form the horizontal till well. It should be noted that these procedures are missing from the GWLMP (DOE 1997) and from the Sitewide CERCLA Quality Assurance Project Plan.

Response: The horizontal till well is considered to be a Type 1 monitoring well. Samples are collected from the horizontal till well in accordance with Section 6.2 and Appendix K.4.2 of the Sitewide CERCLA Quality Assurance Project Plan and Environmental Monitoring Project standard operating procedure SMPL-02, Liquids and Sludge Sampling, with the exception of purging. In accordance with Section B.1, Note 4 of the On-Site Disposal Facility Groundwater/Leak Detection and Leachate Monitoring Plan, purging of the horizontal till wells was not required. Purging was not required because prior to the December 1998 sampling event, the yield volumes and recharge rates of the horizontal wells were unknown.

The uncertainty regarding the horizontal till well yield was due to the following factors: 1) Type 1 wells (till wells) have a high variability in recharge rates from well to well due to the variable till hydrogeology. This variability and till physical heterogeneity was confirmed by the Pre-Design Investigation and Site Selection Report for the On-Site Disposal Facility and Addendum Report, and by pumping tests conducted as part of the Operable Unit 5 Remedial Investigation; and 2) construction of the on-site disposal facility requires excavation of a portion of the till to expose a subgrade that must meet specified densities and compaction requirements. The till wells are installed in this subgrade by trenching and backfilling as specified in the on-site disposal facility

design package. After the wells are installed, a three foot compacted clay liner and a compacted berm is constructed over them. Due to the construction of the on-site disposal facility, the hydrogeological conditions of the till in the proximity of the on-site disposal facility has been changed. Therefore, the performance of the horizontal till wells is uncertain and must be ascertained over time. These uncertainties and the sampling strategies used, were discussed with the EPA and OEPA prior to and during the completion of the On-Site Disposal Facility Groundwater/Leak Detection and Leachate Monitoring Plan.

Since the initial baseline sampling for Cells 1 and 2 and subsequent quarterly sampling of the horizontal till wells for both Cells 1 and 2, it has been observed that the available water volume for sample collection did not decrease. This was also observed during the monthly baseline sampling for Cell 3. Consequently, it was decided to try a three well volume purge of the horizontal till wells for Cells 1, 2, and 3 in December 1998. The wells essentially went dry after purging approximately one well volume (1150 gallons) at a purge rate of three to five gallons per minute. However, slow recharge was observed which produced a sufficient volume of water for sample collection. During the first quarter of 1999 sampling of the horizontal till wells, it was observed that the horizontal till wells for Cells 1, 2, and 3 had a full recovery after the first sampling event in December. Subsequently, a full well volume was purged from the three wells. Their recharge was slow, but adequate enough to collect the volume of water needed for sampling. However, full recharge was not observed during sampling. Due to the current recharge observations and concerns presented in the comments on the Technical Memorandum for the On-Site Disposal Facility Cell 1 Baseline Groundwater Conditions, the following path forward is being proposed:

DOE will collect baseline samples for Cells 1, 2, and 3 every other month with a three volume purge or purge to dry, whichever occurs first. This will allow for the collection of independent samples. Sampling of the horizontal till wells will continue during impacted material placement for two years to account for seasonal variations and to provide a sufficient number of independent samples to perform the required statistical analysis. Since purging was initiated during December 1998, baseline sampling of Cells 1, 2, and 3 will continue every other month until December 2000.

Upon the completion of baseline data collection, the horizontal till well data will be statistically evaluated. A new technical memorandum will be written to address the new baseline for the Cell 1 horizontal till well after the aforementioned sample completion date of December 2000. However, the sampling results will continue to be reported in IEMP quarterly status reports.

A change to the baseline strategy for the horizontal till wells for Cells 4 through 8, and contingency Cell 9, is also being proposed. Since the projected schedule of the horizontal till well installation and initial impacted material placement will continue to have a relatively short time between them, the strategy is the same for Cells 4 through 8 as that for Cells 1, 2, and 3; which is, purge and sample the wells before and during impacted material placement for a minimum of two years to allow for the collection of independent samples and for the data to be representative of seasonal variations.

Action: The changes noted in the response will be made to the groundwater/Leak Detection and Leachate Monitoring Plan: (i.e., extending the baseline sample collection period for the horizontal till wells that will include a period of waste placement activities, and purging the horizontal till wells at least three well volumes, or purge to dry, whichever comes first.)

4. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 2.0 Pg.#: 6 Line#: 16 Code: M
Original Comment# 3
Comment: The text indicates that 15 sampling rounds were completed in the horizontal till well in the period from the end of October through early December. Assuming that the sampling procedure used involves purging at least one well volume prior to sample collection and that one well volume is, at minimum, several hundred gallons, the well appears capable of producing a significantly greater volume of water than was initially envisioned. For example, the GWLMP states (p. 4-6, paragraph 6) that the "clay-rich deposits may not readily yield fluid to a well." Such high well yields are contradictory to the hydrogeology of the perched zone which is characterized in the GWLMP as having an average gray till thickness of 30 feet and a percentage of interbedded sands and gravels of approximately four percent. Given the purging protocol assumed above, what is the groundwater source enabling the till well to be sampled 15 times in less than two months?
Response: See Comment Response #3.
Action: See Action #3.

5. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 3.0 Pg.#: 9 Line#: 2 Code: C
Original Comment# 4
Comment: The Ohio EPA agrees with the choice of an intra well approach for evaluating groundwater data at the OSDF, particularly for the till. As indicated in the text, flow in the till is essentially vertical resulting in no recognizable up versus down gradient in that unit. The technique is also appropriate for the GMA to account for heterogeneity in the aquifer and the gradient reversal conditions discussed.
Response: DOE acknowledges the comment.
Action: No action required.

6. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 3.0 Pg.#: 9 Line#: 2 Code: C
Original Comment# 5
Comment: USEPA (1993) recommends against using control charts for truncated data sets (i.e., data sets with a large nondetect fraction). Organic COCs are typically characterized by a large amount of nondetects. Gibbons (1994) indicates that control charts should only be used for data sets with at least 25 percent quantified values. The sample variance is not adequately quantified for data sets with fewer than 25 percent quantified values. An alternative approach to control charts, therefore, should be identified for TCE in OSDF Well 22201 (one estimated detect in 15 sample rounds).
Response: DOE agrees with the comment. Control charts will only be used for those constituents that have at least 25 percent detectable concentrations. Those constituents that have less than 25 percent detectable concentrations will be considered to be non-detect in baseline, and will be evaluated with post-baseline data as described in the technical memorandum.
Action: As noted in the response.

7. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 3.0 Pg.#: 9 Line#: 29 Code: C
Original Comment# 6
Comment: Application of the control chart method is complicated by the pre-existing contamination at the OSDF. Pre-existing contamination can cause trends in the baseline data that are completely unrelated to the OSDF. The statistical procedures presented in this document should, therefore, include trend analysis of the baseline data and, if trend exists,

demonstrate the application of the estimated trend to the raw data. The de-trended data can then be used for computing the sample mean, variance, and the control limits. Failure to account for trend in the baseline data will result in biased estimates of the population parameters and control limits.

Response: DOE acknowledges the comment. However, currently DOE does not believe that there is sufficient baseline data to assess the possibility of a trend existing due to pre-existing contamination. To properly perform a trend analysis on groundwater data there would need to get at least two or three years of quarterly or monthly data in order to account for seasonal effects. Over a short period of time what may appear to be a trend may simply be seasonal variation, an abnormally high or low value, or even just natural variation. Prior to attempting to determine a trend, the data would need to be assessed for seasonal effects and possible outliers. Due to construction deadlines much of the baseline data was collected over an accelerated time span. In no case is there sufficient baseline data to assess seasonal effects. According to EPA/530-SW-89-026, Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance, "Corrections for seasonality should be used with great caution as they represent extrapolations into the future. There should be a good scientific explanation for the seasonality as well as good empirical evidence for the seasonality before corrections are made." De-trending the baseline data when there are insufficient data to determine what is the cause of any "observed" trends (real trend or seasonal variation?) or if an observed trend is due to an extreme value, possibly an outlier, can be misleading and result in false positives or false negatives. Therefore, DOE believes that a trend analysis and de-trending the current baseline data set would potentially yield false negatives or false positives, which would be misleading. Trend analysis may be viable after collecting two years of baseline data and assessing seasonal variability.

Action: No action required.

8. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 3.0 Pg.#: 9 Line#: 30 Code: C
Original Comment# 7

Comment: The baseline data should be screened for outliers prior to the computation of the mean, variance, and control limits. Any detected outliers should be excluded from the control chart but should be identified using a unique symbol on the control chart plots. Failure to exclude outliers from the control chart calculations will result in an artificially inflated false negative rate (i.e., concluding no impact when, in fact, impact exists).

Response: DOE agrees with the comment. DOE believes there would be a benefit from outlier detection and elimination from the baseline data because it may eliminate any "observed" trends in the baseline data. After outliers have been identified and eliminated, the control limits will be calculated and monitoring data will be plotted.

Action: Data will be screened for outliers and eliminated. DOE will update the Great Miami Aquifer baseline control charts and provide them to the agencies during the second quarter of 1999.

9. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.0 Pg.#: 10 Line#: 20 Code: E
Original Comment# 8

Comment: Revise text to read "Table 3 identifies the range of concentrations for the seven. . ."

Response: The text in question refers to the perched water and if the reviewer refers to Table 3, it can be identified that only six constituents were detected. Tetrachloroethane was non-detectable in the perched water and detected in the Great Miami Aquifer.

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Action: No action required.

10. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.0 Pg.#: 10 Line#: 22 Code: M
Original Comment# 9
Comment: The text indicates that the baseline data set generated by collecting 15 till well samples in less than two months is "limited in regards to representing the range of variability in perched water quality." Assuming that a low-flow (micropurging) sampling technique was used in collecting the 15 till well samples, ambient groundwater flow must be sufficient to permit flushing the volume of the 6.0-inch horizontal well on approximately a bi-weekly basis. As is presented in the Pre-design Investigation and Site Selection Report for the OSDF (DOE 1995), however, groundwater flow at the site is essentially vertical and in the vicinity of Cells 1 and 2 is on the order of 0.06 feet/year. Vertical flow at this rate would require approximately eight years for ambient flow to flush one well volume. In order to ensure the collection of independent samples from monitoring wells installed in glacial till, USEPA (1989) recommends a minimum one month period between sampling rounds. Given the assumed micropurging sampling procedure, the same volume of water was, therefore, probably sampled during each of the 15 baseline rounds. The collection of non-independent samples is the likely reason that baseline samples showed limited variability. USEPA (1989) states that the most important assumption in the use of control charts is that the data analyzed are independent. A revised approach for characterizing perched groundwater baseline conditions in the horizontal till wells is needed. Assuming that very slow rates for vertical groundwater flow exist at the OSDF, FEMP should determine what minimum time interval between sampling is required to ensure that groundwater samples will be independent.
Response: See Comment Response #3.
Action: See Action #3.

11. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.0 Pg.#: 10 Line#: 39 Code: C
Original Comment# 10
Comment: The total uranium pre-design data discussed in the referenced text could not be located in the pre-design documents and should be summarized in this technical memorandum. Total uranium concentrations from pre-design well cluster 11491/11492 and 11493/11494 ranged from 0.35 to 14.4 μg/L.
Response: The reference in the technical memorandum which reports a range of total uranium concentrations from non-detectable to 35 μg/L includes data from both well and lysimeters. The lysimeter and well data are located in the addendum to the Pre-Design Investigation and Site Selection Report for the On-Site Disposal Facility.
Action: No action required.

12. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 5.0 Pg.#: 11 Line#: 22 Code: C
Original Comment# 11
Comment: The text should include a discussion of how and at what frequency the control charts will be updated. As indicated by USEPA (1989) "as monitoring continues and the process is found to be in control, these parameters (baseline sample-based estimates of the mean and standard deviation and the pre-selected performance parameters h, k, and SCL) need periodic updating so as to incorporate this new information into the control charts"
Response: Control charts will be updated annually and provided in IEMP annual integrated site

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environmental reports. This was identified on lines 20 through 23 on page 14 of the memorandum.

Action: Control charts will be updated annually and provided in IEMP annual integrated site environmental reports.

13. Commenting Organization: OEPA Commentor: OFFO
Section#: 4.1 Pg.#: 12 Line#: 9-19 Code: C
Original Comment# 12

Comment: The Ohio EPA has concerns about the validity of combining the two baseline data sets from the Cell 1 and Cell 2 horizontal till wells. The two wells are almost certainly placed in different perched water systems. Is there any data from other perched systems that supports combining the two data sets? Are there statistical tests which can be used to decide if two sets of data are drawn from the same population?

Response: There are many ways of determining if two sample data sets can be assumed to be drawn from the same population. Parametric methods include comparison of means in conjunction with a comparison of variances. To use these methods, the underlying distribution type must be assumed, whether it be Normal, Lognormal, or something else. Non-parametric procedures do not require such assumptions. Though many non-parametric procedures do require some assumptions be satisfied, these requirements are usually far less restrictive (e.g., that the distribution be symmetric - far less restrictive than having to be normally distributed). The appropriate methodology will be determined when all baseline data collection has been completed.

Action: No action required.

14. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 5.0 Pg.#: 13 Line#: 26 Code: C
Original Comment# 13

Comment: The text indicates that COCs detected during baseline monitoring and during post baseline monitoring will be compared against the established control limits. No procedure, however, is provided regarding what will be done if a COC exceeds its control limits. Assume, for example, a COC is detected in the LDS and exceeds its control limits. Does the control chart procedure described in this document include the collection of verification samples. If so, how?

Response: There are no control charts associated with the LDS. However, it is identified in the text (lines 26 through 28) that these exceedances (Great Miami Aquifer and perched water) will be evaluated by a comparison to their corresponding perched water, LCS and LDS concentrations. Therefore, LDS concentrations are used in data evaluations. The additional bullets on page 13 of the technical memorandum provide more detail on evaluation of data. In addition, if it is determined through evaluation that an exceedance is a concern, then the agencies will be contacted and verification sampling will be conducted.

Action: As noted in the response.

15. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: Appendix C Pg.#: N/A Line#: N/A Code: C
Original Comment# 14

Comment: The control charts should be constructed in their original metric (e.g., mg/L) rather than standard deviation units for ease of interpretation.

Response: The control charts are constructed per suggested guidance in the Statistical Analysis of Ground-Water Monitoring Data RCRA Facilities, Section 7. The control limits are

identified with their metric values on each control chart and non-standard data are provided in Appendix A of the technical memorandum.

Action: No action required.

16. Commenting Organization: OEPA Commentor: OFFO
Section#: 5.2 Pg.#: 14 Line#: 3 Code: C
Original Comment# 15

Comment: The text states that data review will determine if volumes of leachate in the LCS and LDS is increasing. As stated in Section 4.6.1 of the OSDF Groundwater/Leak Detection and Leachate Monitoring Plan, trend analysis is an appropriate tool to evaluate the data.

Response: DOE agrees with the comment.

Action: Trend analysis will be used to evaluate LCS and LDS data. As stated in Section 4.6.1, the trend analysis will be developed for a cell's LDS and LCS after the cell has been closed.

In addition to the trend analysis for the LDS, leakage rates will also be monitored. Action leakage rates which have been calculated for the LDS system and are in the on-site disposal facility design package. The text in Section 4.4.2.1, of the On-Site Disposal Facility Groundwater/Leak Detection and Leachate Monitoring Plan, states, "Action leakage rates for each LDS manhole are to be developed later based upon measurements after the final cover has been placed over that cell". This text needs to be changed. The following text is being suggested as the change: "Leakage rates for each LDS manhole are to be monitored by collecting weekly measurements of the fluid levels in the LDS manhole primary containment vessel". The monitoring plan will be modified and resubmitted. These LDS manhole primary containment vessel measurements will be used to calculate the daily leakage rates (volume/acre/day). This rate will be compared to the action leakage rate calculated in the design package for the On-Site Disposal Facility and reported in IEMP quarterly status reports.

17. Commenting Organization: OEPA Commentor: OFFO
Section#: 5.3 Pg.#: 14 Line#: 15 Code: C
Original Comment# 16

Comment: The bullet states that summary data will be provided in the Quarterly IEMP Status Reports. Please provide the complete data set including weekly LDS volumes.

Response: DOE agrees with the comment.

Action: DOE is continuing to provide weekly LDS volumes on data disks through IEMP quarterly status reports.

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