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RESPONSES TO OEPA COMMENTS ON THE INTEGRATED ENVIRONMENTAL MONITORING STATUS REPORT FOR FOURTH QUARTER 1999

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

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U.S. DEPARTMENT OF ENERGY

RESPONSES TO OEPA COMMENTS ON THE INTEGRATED ENVIRONMENTAL MONITORING STATUS REPORT FOR FOURTH QUARTER 1999

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COMMENTS

1. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: 1.2.1.2 Page #: 1-6 Line #: 19 Code: C
Original Comment #: 1

Comment: Field filtering of groundwater samples collected at the site should not be performed unless an unfiltered (total) uranium sample is always collected along with the filtered sample. The unfiltered sample is critical because it will include all forms of mobile uranium in the groundwater (both aqueous and the mobile solid phase). The existence of mobile colloids in site groundwater has been demonstrated by use of the colloidal borescope which passively measures the direction of groundwater flow by the movement of colloids in a well. Filtering would undoubtedly remove some or all of these colloids. The loss of uranium could also occur due to sample alterations that may occur during filtering. For example, as indicated in USEPA (1992) guidance, exposure of a sample to the atmosphere introduces oxygen that can oxidize dissolved ferrous iron in the sample to ferric hydroxide precipitate. The ferric hydroxide precipitate may enmesh other metals (i.e., uranium) in the sample, removing them from solution. The precipitate and the entrapped constituents would be removed by field filtration. Proper well development and maintenance (as is exemplified by the treatment of Monitoring Well 3027 later in Section 1.2.1.2) should be relied to reduce turbidity rather than relying on field filtering.

Response: The U.S. Department of Energy (DOE) agrees with the Ohio Environmental Protection Agency (OEPA) that, for the immediate future, an unfiltered uranium sample should and will also be collected whenever field filtering of a sample occurs. DOE proposes to filter a groundwater sample only if the turbidity of the sample exceeds 5 nephelometric units (NTU). By also collecting the unfiltered uranium sample, DOE can compare the uranium concentration results from both the filtered and unfiltered samples to determine what effect turbidity has on uranium concentrations in groundwater samples at the Fernald Environmental Management Project (FEMP).

This filtering strategy is based on the Ohio Environmental Protection Agency (OEPA) guidelines for deciding when to filter a groundwater sample presented in the Technical Guidance Manual for Hydrologic Investigations and Ground Water Monitoring (OEPA 1995). On page 10-21, the following guidance is given: "The Agency believes that it is practical to establish a value (5 nephelometric units [NTUs]) to serve as a "cut-off" for determining when filtration is necessary". This guidance is based on the assumption that any immobile component of turbidity present (in samples with <5 NTU turbidity) will impart an insignificant amount of species to a sample analysis.

With this guidance in mind, DOE proposes to filter groundwater samples that have a turbidity of > 5 NTU through a 5-micron filter. If the sample filtered through a 5-micron filter is still above 5 NTU, then the filtered sample will be re-filtered through a 0.45-micron filter. The filter size(s) used will be identified in the Site Environmental Database. By definition (Glossary of Geology, 3rd edition, Bates and Jackson), colloids have a diameter of 0.24 microns or less. Colloids should therefore pass through the 0.45-micron filter and remain in the sample.

In response to the oxidation concern, the majority of the FEMP's wells that are routinely sampled are equipped with QED™ equipment to enable low flow purge sampling.

Filtering at QED equipped wells is conducted with in-line filters that minimize sample exposure to the atmosphere. Sampling personnel understand that exposing the sample to the atmosphere can alter the chemistry of the sample. At non-QED equipped wells, sampling personnel do their best to minimize exposure of the sample to the atmosphere.

DOE is committed to installing and maintaining groundwater-monitoring wells that yield representative groundwater samples. All monitoring wells are properly developed upon installation. DOE will be observant of any well that yields a groundwater sample that is consistently above 5 NTU and will take actions to determine if the well needs to be further developed. DOE does not intend to use turbidity to mask well integrity issues. The intent is to get representative samples, and to understand the effect of turbidity on uranium concentrations in groundwater samples at the FEMP.

Action: Pending the U.S. Environmental Protection Agency (EPA) concurrence, if filtering of a groundwater sample is required due to turbidity of >5 NTU, then DOE will collect both filtered and unfiltered samples for total uranium analysis.

2. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: 1.2.2.3 Page #: 1-11 Line #: 4 Code: C
Original Comment #: 2

Comment: The submission date of the flow model report has been a moving target for at least the past six months. As recently as March 7, 2000, DOE indicated that the flow calibration report had been received in December and would be provided to the agencies for review in a few weeks. Why now does DOE vaguely state that the report will be made available later this year? Similarly, in the same March 7 phone call, DOE stated that work on the transport model was completed and that the draft data fusion report would be issued later that month; the agencies would see the document by no later than late April. In the case of both the flow and the transport model, the work has been completed but DOE appears to be unwilling to release the reports documenting these efforts. Unfortunately, such actions are corrosive to agency confidence in the new model and the purported benefits of data fusion technology. To correct this situation, DOE should provide a time frame for submittal of the two documents as soon as possible. At the very least, the flow and transport data sets should be provided immediately while the supporting documents are "undergoing internal review."

EPA, 1992 RCRA Ground-Water Monitoring: Draft Technical Guidance, EPA/ 30-R-93-001, November 1992.

Response: Two reports concerning the groundwater model for the site were transmitted to EPA and OEPA on May 30, 2000 (reference letter number DOE-0722-00). The first report, Great Miami Aquifer VAM3D Flow Model Re-Calibration Report, summarizes a groundwater flow model re-calibration of the VAM3D model, which was developed in Phase I of the model upgrade project. The model re-calibration was necessary to bring steady state model predictions of groundwater elevations into better agreement with measured elevations. The re-calibrated flow model was used in the development of data fusion modeling (DFM) technology for the transport code as documented in the second report, Integration of Data Fusion Modeling (DFM) with VAM3DF Contaminant Transport Code.

The second report summarizes the development of DFM for contaminant transport and demonstrates its applicability to the site. However, the application to historic site data has not yet been completed. The application of DFM to site data is scheduled to begin this summer.

Action: Reports were submitted as noted in the comment response.

3. Commenting Organization: OEPA Commentor: OFFO 3060
Section #: 2.1.1 Page #: NA Line #: NA Code: C
Original Comment #: 3

Comment: The text in the third paragraph states that this is the first quarter for which the accumulation rate in the Cell 1 LDS is greater than the accumulation rate in the Cell 2 LDS. The text goes on to state that this is unexpected because the stage of filling of Cell 1 is much greater than Cell 2. Why is it expected that the LDS accumulation rate should be greater for Cells that are in earlier stages of filling? We note that the accumulation rates in the LDS of Cell 2 have recently been greater than in Cell 1.

Response: It is expected that the leak detection system (LDS) accumulation rate would be higher in cells with less fill because there is a relatively higher potential for more leachate to come in contact with the top liner. Therefore, a relatively higher potential for more leakage exists for cells in the earlier stages of filling (reference the EPA Report of 1995 Workshop On Geosynthetic Clay Liners, Appendix F). As a cell becomes filled, leachate flow is reduced and buffered because it has to percolate through the fill, whereas in new cells the leachate flow comes in contact with the top liner much more quickly and therefore has more of a potential to create a pressure/hydraulic head on the liner. This is particularly the case prior to filling a cell's one-acre impacted runoff catchment area located in the southwest corner of each cell. Prior to that time, impounded runoff which exceeds the leachate collection system (LCS) piping capacity, will induce a hydraulic head in the area. Once filled, the slower percolation of water through the waste will help to allow the piping system to more readily handle the inflow and reduce the hydraulic head in the catchment area. As the waste becomes thicker, the percolation rate continues to decrease further and the potential for hydraulic head will continue to decrease. Finally, after a cell is capped, the potential for such a head to occur will become remote.

DOE agrees that the Cell 2 LDS accumulation rates have recently been greater than Cell 1. The increase in the Cell 2 accumulation rate began in January 2000 and appears to correlate with rainfall during January and February. This is discussed in the Integrated Environmental Monitoring Status Report for First Quarter 2000.

Action: No action required.

4. Commenting Organization: OEPA Commentor: OFFO
Section #: 2.2.1 Page #: NA Line #: 1st paragraph Code: C
Original Comment #: 4

Comment: The text states that the maximum fourth quarter flow rate in the LDS of Cell 2 is less than five percent of the third quarter average of 3.8 gpad. This statement is true but we do not think it is relevant to understanding either the progression of flows (i.e., the expected changes in the flow volumes as the cell matures from a new empty cell to a partially filled cell to a closed cell) or the integrity of the primary liner. The high third quarter flows can be attributed to the December 1998 back up of the LCS into the LDS manhole and subsequently into the LDS drainage layer of Cell 2.

Response: The text that is the subject of this comment was put in the report for comparative purposes to show how the accumulation rates were changing from quarter to quarter. It is important to DOE to compare quarter to quarter accumulation rates as they are key indicators of how the liner is performing.

DOE feels that the water from the December 1998/January 1999 backups had likely drained out long before the third quarter of 1999. The basis for this is that the volume that could have backed up into the cell was such that it likely would not have extended more than a few feet into the cell and therefore would have drained out shortly after the manhole was pumped out. DOE feels that the bulk of the water coming out of the Cell 2 LDS

during the third quarter was likely construction water. As described in Appendix A, Attachment A.6 of the 1999 Integrated Site Environmental Report, over 140,000 gallons of water fell as precipitation on Cell 2 during construction of its primary liner. The Cell 2 LDS water yield through the end of 1999 was 12,320 or about nine percent of the water that fell on the cell during construction of its primary liner.

Action: DOE will continue to provide quarter to quarter comparison of LDS accumulation rates in future Integrated Environmental Monitoring Plan (IEMP) quarterly status reports.

5. Commenting Organization: OEPA Commentor: OFFO
Section #: 2.1.1 and 2.2.1 Page #: NA Line #: NA Code C
Original Comment #: 5

Comment: The paragraphs in these sections which discuss the ongoing accumulation rates in the LDS continually compare measured volumes to the initial response leakage rate of 20 gpad. This comparison is used to support the contention that the cells are performing as designed. With our approval of the OSDF Design Package, we explicitly agreed to the quoted initial response rate. We do not wish to renege on our approval, but it is intuitive that a flawlessly installed 80 mil HDPE liner will not leak at a measurable rate. The absence of measurable volumes in the Cell 3 LDS support our intuition.

Flow volumes in the Cell 2 LDS for the first quarter of the year 2000 have increased noticeably. There appears to be a definite correlation of increased flows with 4 inches of rain over two days in the first week of January. Flows prior to January 4 were never greater than a non-detect. Starting with an accumulation period ending January 12, flows have been routinely above 0.26 gpad. The first quarter 2000 IEMP Status Report should include a discussion of the increased flows and an attempt should be made to correlate flows with rainfall.

Response: This comment raises the following two issues: 1) DOE's contention that the cells are performing as designed when the leakage rates are below the initial response leakage rates; and 2) the first quarter 2000 increase in Cell 2 LDS flow volumes. The issues are addressed as follows:

1) DOE is designing and constructing the on-site disposal facility to be as leak proof as possible given current technology. DOE is using the 20 gallon per acre per day initial response leakage rate as a benchmark for comparison to current rates in order to assess liner performance. DOE agrees that a flawlessly installed HDPE liner will not leak at a measurable rate, however the design calculations reflect that some flaws in the liner are to be expected. DOE will refrain from making statements that conclude that the liner systems are performing "as designed" just because the accumulation rates are below the initial response leakage rate. However, DOE will continue to provide the cell specific accumulation rates in comparison to the initial response leakage rate.

   Regarding the absence of measurable volumes in the Cell 3 LDS, DOE provided a discussion of that in the 1999 Integrated Site Environmental Report (Appendix A, Attachment A.6). In the referenced discussion, it was concluded that the reason for the absence of measurable volumes from the Cell 3 LDS may be due to the lack of construction water in the Cell 3 LDS, as much drier conditions prevailed during the installation of its top liner than for either Cell 1 or Cell 2.

2) DOE agrees with OEPA's correlation of the increased flows in the Cell 2 LDS with the 4-inch rainfall in early January. DOE has included the requested discussion in the Integrated Environmental Monitoring Status Report for First Quarter 2000.

Action: As noted in the response.

6. Commenting Organization: OEPA Commentor: OFFO
Section #: 4.1.1 Page #: NA Line #: NA Code: C
Original Comment #: 6

Comment: The text states (paragraph 3) that the increase in annual average concentrations at AMS-22 and AMS-23 are insignificant. The increases exhibited at these locations may be due to the increased activity and excavation in the waste pit area, which may be significant since the increase may be related to site activities.

Response: DOE agrees that the increase in the annual average concentrations (1999 vs. 1998) at AMS-22 and AMS-23 may be attributable to remediation activity in the waste pit area. In fact, given the location of these monitors with respect to the waste pit area and the prevailing wind directions, it is likely that emissions from Waste Pits Remedial Action Project (WPRAP) activities contributed to the increases. However, as stated in the text, the increases at AMS-22 and AMS-23 represent a three and 1.1 percent increase over 1998 annual average concentrations, respectively. Given the range of uranium concentrations measured at each monitor during the year and the fact that the (arithmetic) average can be skewed by a single, unusually high sample result, the percentage of the increases were considered insignificant.

Action: No action required.

7. Commenting Organization: OEPA Commentor: OFFO
Section #: 4.1.1 Page #: NA Line #: NA Code: C
Original Comment #: 7

Comment: (Paragraph 6) The increase in Th-230 concentrations at WPTH-1 and WPTH-2 would not be associated with the start-up of the WPRAP dryer. Thorium emissions from the stack would be negligible with proper operation of HEPA filters and other pollution control equipment. The increases should be attributed to waste pit excavation and material handling.

Response: DOE agrees that emissions from the dryer stack would not cause higher fenceline thorium-230 concentrations. The phrase 'WPRAP dryer operations' was used to describe the related events of feeding material into the dryers, the thermal drying of the waste, and the release and subsequent handling of the dried waste material. While the emissions from the thermal drying portion of this process are controlled through the use of HEPA filtration, emissions also occur during the material handling before and after drying the waste. In future IEMP reports, emissions attributed to material handling and pit excavations will be distinguished from dryer stack emissions.

Action: No action required.

8. Commenting Organization: OEPA Commentor: OFFO
Section #: 4.1.1 Page #: NA Line #: NA Code: C
Original Comment #: 8

Comment: The assumption that the temporary increases at AMS-6, AMS-25, and AMS-28 are attributed to fugitive emissions from the overall remediation of the site is inconsistent with the rest of the site-wide data and TSP concentrations. The wide variation in the locations where elevated concentrations occurred would cause one to conclude that other adjacent samplers would exhibit elevated concentrations also. They do not. AMS-28 is most likely due to WPRAP activities.

Response: DOE investigates and attempts to connect short-term increases in fenceline total uranium concentrations with the remediation activities that were in progress during the sampling period. Because of the length of the sampling period (two weeks), changing wind directions, and the varying location and intensity of remediation activity during a sampling period, it is generally difficult to connect a single, short-term increase in fenceline uranium concentrations with a specific remediation activity. In the note on Figure 4-18, DOE attributes part of the short-term increase at AMS-28 to excavation of the waste pits, but the increase is also attributed to fugitive emissions from the site in general. Fugitive emissions from the handling of waste materials and impacted soils within the former production area and current WPRAP project area, as well as, emissions from the excavation of contaminated soil, flyash, and contaminated debris from the southern waste units may have also contributed to the short lived increases at AMS-6, AMS-25, and AMS-28.

Action: No action required.

9. Commenting Organization: OEPA Commentor: OFFO
Section #: Figure 4-8 Page #: NA Line #: NA Code: C
Original Comment #: 9

Comment: If this spike was due to fugitive emissions associated with high winds, one would also expect to see an increase in TSP concentration. Other spikes at other locations usually exhibit a corresponding increase in TSP with total uranium. When total uranium increases without a corresponding increase in TSP, the increase may be associated with some site-specific activity.

Response: Experience has shown that there is not a strong correlation between total particulate and total uranium concentrations, particularly when considering a single sampling event. One reason for the poor correlation between the two measurements is the widely different scales on which total particulate and total uranium are measured. Total particulate is measured in milligrams per filter while total uranium is measured in micrograms per filter. Total uranium on two different filters may vary by an order of magnitude (e.g., 1 µg/filter to 10 µg/filter), yet there may be no measurable difference in the amount of total particulate on the filters. DOE agrees, however, that increases in fenceline uranium concentrations are associated with the site.

Action: No action required.

10. Commenting Organization: OEPA Commentor: OFFO
Section #: Figure 4-23 Page #: NA Line #: NA Code: C
Original Comment #: 10

Comment: The comment on the figure should not include start-up of waste pit dryer.

Response: DOE agrees with the comment. Please refer to Comment Response #7.

Action: No action required.

11. Commenting Organization: OEPA Commentor: OFFO
Section #: 2.1.1 Page #: NA Line #: NA Code: C
Original Comment #: 11

Comment: The text in the third paragraph states that this is the first quarter for which the accumulation rate in the Cell 1 LDS is greater than the accumulation rate in the Cell 2 LDS. The text goes on to state that this is unexpected because the stage of filling of Cell 1 is much greater than Cell 2. Why is it expected that the LDS accumulation rate should be greater than Cell 2. Why is it expected that the LDS accumulation rate should be greater for Cells that are in earlier stages of filing? We note that the accumulation rates in the LDS of Cell 2 has recently been greater than in Cell 1.

Response: This is the same comment as Comment # 3. Please refer to Comment Response #3.

Action: Refer to Action #3.

12. Commenting Organization: OEPA Commentor: OFFO
Section #: 2.2.1 Page #: NA Line #: 1st paragraph Code: C
Original Comment #: 12

Comment: The text states that the maximum fourth quarter flow rate in the LDS of Cell 2 is less than five percent of the third quarter average of 3.8 gpad. This statement is true but we do not think it is relevant to understanding either the progression of flows (i.e., the expected changes in the flow volumes as the cell matures from a new empty cell to a partially filled cell to a closed cell) or the integrity of the primary liner. The high third quarter flows can be attributed to the December 1998 backup of the LCS into the LDS manhole and subsequently into the LDS drainage layer of Cell 2

Response: This is the same comment as Comment # 4. Please refer to Comment Response #4.

Action: Refer to Action #4.

13. Commenting Organization: OEPA Commentor: OFFO
Section #: 2.1.1 and 2.2.1 Page #: NA Line #: NA Code: C
Original Comment #: 13

Comment: The paragraphs in these sections which discuss the ongoing accumulation rates in the LDS continually compare measured volumes to the initial response leakage rate of 20 gpad. This comparison is used to support the contention that the cells are performing as designed. With our approval of the OSDF Design Package, we explicitly agreed to the quoted initial response rate. We do not wish to renege on our approval, but it is intuitive that a flawlessly installed 60 mil HDPE liner will not leak at a measurable rate. The absence of measurable volumes in the Cell 3 LDS support our intuition. Flow volumes in the Cell 2 LDS for the first quarter of the year 2000 have increased noticeably. There appears to be a definite correlation of increased flows with 4 inches of rain over two days in the first week of January. Flows prior to January 4 were never greater than a non-detect. Starting with an accumulation period ending January 12, flows have been routinely above 0.26 gpad. The first quarter 2000 IEMP Status Report should include a discussion of the increased flows and an attempt should be made to correlate flows with rainfall.

Response: This is the same comment as Comment # 5. Please refer to Comment Response #5.

Action: Refer to Action #5.

14. Commenting Organization: OEPA Commentor: OFFO
Section #: 4.1.1 Page #: General Comment Line #: Code: C Original
Original Comment #: 14

Comment: An increase in total uranium concentrations at most sample locations appears to be present at the same time the spikes occurred. The data appears to be inconsistent with TSP concentrations. A closer inspection of the laboratory results or a reanalysis of the samples may be warranted to better understand the results.

Response: DOE has reviewed the set of laboratory results and associated quality control data that were generated for the sampling periods during which the short-lived increases were reported. There were no indications that errors in the laboratory analysis caused the unusually high results. Please refer to Comment Response #9 regarding the inconsistency (or lack of correlation) between total particulate and total uranium results.

Action: No action required.