Department of Energy
Washington, DC 20585

September 28, 2011

Mr. Timothy Fischer
U.S. Environmental Protection Agency
Region V-SRF-6J
77 W. Jackson Blvd.
Chicago, IL 60604-3590

Mr. Thomas A. Schneider
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402

Dear Mr. Fischer and Mr. Schneider:

SUBJECT: **Transmittal of Responses to Ohio Environmental Protection Agency Comments on the 2010 Site Environmental Report**

Reference: 1) Letter, T. Schneider to J. Powell, "Ohio Environmental Protection Agency Comments on the 2010 Fernald Preserve Site Environmental Report," dated August 5, 2011

Enclosed for your review are responses to Ohio Environmental Protection Agency (Ohio EPA) comments on the 2010 Fernald Preserve Site Environmental Report (Reference 1). Consistent with past practice, the 2010 Fernald Preserve Site Environmental Report and appendices will not be revised. Comments will be considered during preparation of the 2011 Fernald Preserve Site Environmental Report.

If you have any questions regarding this report, please call me at (513) 648-3148. Please send any correspondence to:

U.S. Department of Energy
Office of Legacy Management
10995 Hamilton-Cleves Highway
Harrison, OH 45030

Sincerely,

Jane Powell

Jane Powell
Fernald Preserve Manager
DOE-LM-20.2

Printed with soy ink on recycled paper

Enclosure

cc w/enclosure:
M. Cullerton, Tetra Tech
S. Helmer, ODH
G. Hooten, DOE
T. Schneider, OEPA (3 copies of enclosure)
T. Tucker, OEPA-Columbus
Project Record File FER030.1(A) (thru W. Sumner)

cc w/o enclosure:
(electronic)
B. Hertel, Stoller
J. Homer, Stoller
G. Lupton, Stoller
T. Pauling, DOE
K. Reed, DOE
C. White, Stoller

Ohio Environmental Protection Agency
John R. Kasich, Governor
Mary Taylor, Lt. Governor
Scott J. Nally, Director

August 5, 2011
Ms. Jane Powell
Fernald Site Mgr
DOE-LM-20.1
10995 Hamilton Cleves Hwy
Harrison OH 45030

RE: OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE 2010 FERNALD PRESERVE SITE ENVIRONMENTAL REPORT

Ms. Powell:

Ohio EPA has received and reviewed the "Fernald Preserve 2010 Site Environmental Report," (May 26, 2011). Ohio EPA comments are attached.

If there are any questions, please contact me at (937) 285-6466.

Sincerely,

Thomas A. Schneider
Fernald Project Manager
Division of Environmental Response and Revitalization
Federal Facilities Section

Cc: Tim Fischer, US EPA
Bill Hertel, Stoller Corp.

Southwest District Office
401 East Fifth Street
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Ohio EPA Comments on:

Fernald Preserve, 2010 Site Environmental Report
May 2011

Summary

1. Commenting Organization: Ohio EPA
   Section #: General Comment Pg #: na
   Comment: The debris tracking sheet should be included with the inspection data on the DOE web site (http://www.lm.doe.gov/Fernald/reports/) and submitted to regulators along with the quarterly inspection reports. Debris tracking is part of the inspection process and should be included with the other documentation. The debris tracking spreadsheet was previously provided to regulators as part of the monthly conference call information; however there is currently not a mechanism to review these other than by regularly requesting them.

2. Commenting Organization: Ohio EPA
   Section #: 3.3.1.1 Pg #: 3-12
   Comment: The text states that uranium discharge limits can now be achieved without groundwater treatment. CAWWT is an asset to the site. The pumping strategy may need to be changed in order to achieve final aquifer remediation levels. DOE should thoroughly investigate whether the CAWWT will be needed and/or be utilized to optimize uranium capture in the future. Additionally, increased rainfall may raise the aquifer levels into the currently unsaturated zones of the aquifer. This may increase the concentrations of uranium in water extracted from the aquifer. DOE should thoroughly investigate whether treatment will be necessary in the future.

3. Commenting Organization: Ohio EPA
   Section #: Table 2-1 Pg #: 2-11
   Comment: Delete the last sentence in second column, "The trustees interacted with the FCAB and CRO." Update to add current interaction with FCA.

4. Commenting Organization: Ohio EPA
   Section #: 6.2 Pg #: 6-14
   Comment: In the 3rd sentence of the first paragraph add "contaminated debris" to the list of what is documented in the site inspections.

5. Commenting Organization: Ohio EPA
   Section #: 6.3 Pg #: 6-14
   Comment: This section should direct readers on how to view inspection results, both on the web and in person. A specific web address and phone number/address should be provided. A reference to inspection findings and the debris tracking sheet in appendix should be made here.

Appendices A Through D

6. Commenting Organization: Ohio EPA
   Section #: General Comment Pg #: na
   Comment: The nomenclature to identify "up gradient" and "down gradient" wells may not be accurate due to active pumping changing the natural flow around the site. Figures A.3-1 through A.3.4 indicate the flow of the aquifer as generally from northeast to southwest rather than west to east due to pumping. The "up gradient" and "down gradient" monitoring wells were design for west (up) to east(down) aquifer flow.

Appendix A

Attachment A.1

7. Commenting Organization: Ohio EPA
   Section #: A.1 Pg #: A.1-3 Line #: 24
   Comment: This statement may be premature given the concentration rebound issues observed in site monitoring wells during extended shutdowns.

8. Commenting Organization: Ohio EPA
   Section #: A.1 Pg #: A.1-4 Line #: 14
   Comment: The text notes that transport modeling results are shown on Figures A.1-10 through A.1-32 for each extraction well. These plots, however, only show the predicted concentrations for 2010 and beyond. The plots should also include the predicted concentrations for previous years.

9. Commenting Organization: Ohio EPA
   Section #: A.1 Pg #: A.1-4 Line #: 36
   Comment: The table shows that, based on "data" (though not stated, it is assumed that the term "data" means the "best-fit" trend line through the measured concentration data), 10,261 pounds of uranium have been extracted by the pump and treat remedy since pumping began. The table also shows that, based on the 95 percent upper confidence level (95UCL) on the "data," an equal amount of uranium has been extracted. However, the estimate based on the 95UCL should exceed the estimate based on the mean because the 95UCL concentrations are an upper confidence level on the mean and, by definition therefore, are greater in value than the mean. DOE should account for this apparent inconsistency in terminology and associated extracted mass estimates.

10. Commenting Organization: Ohio EPA
    Section #: A.1 Pg #: A.1-4 Line #: 36
    Comment: DOE should discuss how the model estimate for extracted mass shown in the table was derived. Given that a model-derived extracted mass to-date is provided, it is presumed that DOE has constructed a solute transport model based on initial concentrations measured in 1993 and that DOE ran the model forward in time to arrive at an estimate for extracted mass in 2010. Please provide simulated monthly concentrations for each extraction well from 1993 to the present so that the model estimate can be verified.

11. Commenting Organization: Ohio EPA
Section #: A.1.5 Pg #: A.1-5
Comment: In the column header line for Table A.1-1, "Uranium Removal Index" is footnoted with a "b." However, the information provided in this Footnote "b" defines the "NA" entry in the table. A footnote should be added to define Uranium Removal Index. Footnote "b" should be applied to the first appearance of "NA."

Attachment A.2

12. Commenting Organization: Ohio EPA
Section #: A.2.0 Pg #: A.2-1 Line #: na
Comment: Ohio EPA understands that a smaller slot size sampler was used; however, Ohio EPA does not understand why this would cause the samples to be rejected. Provide further explanation on why the slot size would affect the analytic results.

13. Commenting Organization: Ohio EPA
Section #: A.2 Pg #: A.2-1 Line #: 43
Comment: As shown by Table A.2-12, 25 out of the 55 monitoring wells listed have either an up significant trend or have no significant trend. Pump and treat operations have been ongoing for 18 years; significant pumping commenced 13 years ago. With 45 percent of monitoring wells showing either an up- trend or no significant trend after years of remedy operation, the model-estimated completion date of 2023 (12 years from now) appears to be in question.

14. Commenting Organization: Ohio EPA
Section #: A.2 Pg #: A.2-5 Line #: 34
Comment: Given that the uranium concentration data from site monitoring wells suggests that the aquifer cleanup may take a longer time than the model originally predicted, DOE's conclusion that flushing the SSOD with clean water is of marginal benefit now appears to lack credibility. DOE should, therefore, consider maintaining the flow of clean water in the SSOD or revise the model sufficiently so that the model is reliably able to show that this activity is unbeneficial (or beneficial) to the cleanup operation.

15. Commenting Organization: Ohio EPA
Section #: A.2 Pg #: A.2-5 Line #: 34
Comment: The text indicates that Well 42471 ceased pumping due to an electrical issue and that the LIMCP states that pumping will continue until the wells are no longer operable; DOE stops short of stating any action that it will take in response to this situation. Will DOE repair Well 42471 or will DOE plug and abandon this well? If DOE intends to plug this well, when will DOE perform this task?

16. Commenting Organization: Ohio EPA
Section #: A.2 Pg #: A.2-7 Line #: 11
Comment: In order to accurately reflect the model's predictive capability, the predicted concentrations used in the residuals analysis should be compared with the initial concentrations specified for the 2006 Waste Storage Area Design model. The initial concentrations for this model were based on the initial site wide concentrations measured in April 2005.

17. Commenting Organization: Ohio EPA
Section #: A.2 Pg #: A.2-7 Line #: 14
Comment: As evidenced by the relatively large positive average residual, the model is generally under-predicting the true concentration. This too-rapid of a decline in predicted dissolved concentration is likely a function of the initialized plume having concentrations that are too low, inaccurate assumptions regarding the transition of uranium from the sorbed to the dissolved phase, and use of an uncalibrated transport model.

18. Commenting Organization: Ohio EPA
Section #: A.2 Pg #: A.2-17 Line #: Table A.2-13
Comment: The footnote to this table indicates that the residual analysis was only conducted using the wells from Layer 12, the top model layer. DOE should revise the residual analysis to include all available monitoring wells from all model layers.

Attachment A.3

19. Commenting Organization: Ohio EPA
Section #: A.3.1 Pg #: A.3-1
Comment: Untitled table at the bottom of the page. The table shows "X"s in various columns; however, there is no text to indicate that the "X"s represent that the wells were sampled or not sampled.

20. Commenting Organization: Ohio EPA
Section #: A.3.1 Pg #: A.3-3
Comment: DOE's decision to eliminate cluster hydrographs from future SER reports is reasonable. DOE should indicate whether groundwater level data will continue to be collected and compiled for the Type 3 wells in future monitoring events.

Attachment A.5

21. Commenting Organization: Ohio EPA
Section #: A.5 Pg #: A.5-5 Line #: 34
Comment: DOE should clarify how non-detect concentrations are handled in the summary statistics calculations shown in Tables A.5.1-1 through A.5.8-1. Specifically, DOE should summarize how are non-detects accounted for in calculation of mean concentrations (e.g., simple substitution of half of the MDL?). Also, how is it noted in these tables if the median concentration of a constituent for one of the cell monitoring horizons is a non-detect value?

22. Commenting Organization: Ohio EPA
Section #: Attach. A.5 Pg #: A.5-7 Line #: 19
Comment: EPA's 2008 Statistical Analysis of Groundwater Data at RCRA Facilities – Unified Guidance (Unified Guidance) suggests that only the CUSUM limit (h) be used; it is unnecessary to include the Shewart control limit (SCL) on the control charts.

23. Commenting Organization: Ohio EPA
Section #: A.5 Pg #: A.5-12 Line #: 20
Comment: Although the standing water may not affect system operation, it may significantly impact the statistical independence of the monitoring data being collected. An implicit assumption of the OSDF monitoring program is that liquids sampled during a given quarter enter each respective system during that quarter. The presence of standing water introduces the possibility that sampled liquids are from a standing volume accumulated over many quarters. Mixing of this volume calls into question the independence of samples from different times. DOE should indicate the percentage of the LCS and LDS for each cell that contain standing water and assess the impact of this standing water on sample integrity.

24. Commenting Organization: Ohio EPA
Section #: A.5 Pg #: Table A.5-3
Comment: The explanatory text at the bottom of this table needs to be clarified. Specifically, more detailed explanation of the "25%" and shaded cell table entries is needed. For example, "25%" denotes "has been detected at least 25% of the time, but not in 2010." Does this mean that the analyte was not detected at all in 2010 or not detected 25% of the time in 2010?

25. Commenting Organization: Ohio EPA
Section #: A.5 Pg #: Table A.5.1-1
Comment: The footnotes for this table for Cell 1 and for the equivalent tables for Cells 2 through 8 are missing critical information and need revision. Footnote "c" should discuss how nondetects are handled in the calculations of the average, median, and standard deviation. Footnote "c" should also indicate that the average is calculated for samples with n>=3 and standard deviation is calculated for samples with n>=4. Footnote "d" should include average and standard deviation in the list of potential parameters flagged "insuff." Footnote "e" should discuss the use of the Shapiro Francia method for testing normality in datasets with n>50 and should indicate that distribution testing is conducted on samples with n>=3. Footnote "f" should indicate that trend testing is conducted on samples with n>=4. Footnote "g" should indicate that serial correlation testing requires a sample with n>=6. Footnote "h" should indicate that outlier testing requires a sample with n>=4.

26. Commenting Organization: Ohio EPA
Section #: A.5 Pg #: Table A.5.1-1
Comment: Tables A.5.1-1 through A.5.8-1 identify the constituents having datasets with the requisite conditions for control charting (at least eight samples, normal or lognormal distribution, no serial correlation, and no trend). Inspection of these tables indicates that qualifying LDS datasets have been systematically excluded. Qualifying datasets include for Cell 1 TOC, boron, cobalt, lithium, nickel, and zinc; for Cell 2 Boron; for Cell 3 TOX, cobalt, iron, lithium, nickel, and sodium; for Cell 4 uranium, TOX, arsenic, nickel, and zinc; for Cell 5 TOX, iron, selenium, and zinc; for Cell 6 TOX, manganese, and selenium; for Cell 7 uranium, TDS, cobalt, lithium, and sodium; for Cell 8 manganese, nickel, selenium, and zinc. DOE should either provide control charts for these constituents or explain why they are excluded from analyses via control charts.

27. Commenting Organization: Ohio EPA
Section #: A.5.2.1 Pg #: A.5-6
Comment: Data distribution and trends were checked with statistical tests with 95% confidence interval. When checking for serial correlation the statistical test was ran with 99% confidence interval. Why is the Von Neuman test ran at 99%?

28. Commenting Organization: Ohio EPA
Section #: A.5.2 Pg #: A.5.2-9, 12
Comment: Figure A.5.2-2 indicates that approximately 1 gallon of leachate was collected from the LDS of Cell 2. However, Figures A.5.2-6A, et al. do not indicate any analytical data was collected from this 1 gallon of leachate. Why were no analysis done?

29. Commenting Organization: Ohio EPA
Section #: Attach. A.5 Pg #: A.5.3-2 Line #: 12
Comment: As indicated in the EPA Unified Guidance, prior to updating control chart background data, Student's t- or Wilcoxon Rank Sum Test should be used to compare the in-control data to the background data. In addition, the CUSUM should be reset to zero since it will already have been affected by the compliance measurements now being added to background.

30. Commenting Organization: Ohio EPA
Section #: A.5.4.2 Pg #: A.5.4-3
Comment: In the last paragraph of this section and throughout this attachment "out of control" parameters are explained away because the bivariate plot of uranium and sodium indicate different liquid signatures. Ohio EPA has requested in the past and now, again, that both trilinear plots and Stiff diagrams be used demonstrate potential differences in chemical composition between leachate and the various zones being monitored. The uranium/sodium bivariate plot may not adequately address the changing water quality.

31. Commenting Organization: Ohio EPA
Section #: Attach. A.5 Pg #: A.5.6-2 Line #: 12
Comment: HTW data are missing from the table.

32. Commenting Organization: Ohio EPA
Section #: Attach. A.5 Pg #: A.5.8-4 Line #: 13
Comment: The clustering of the HTW and LDS data is a result of similar sodium concentrations in each horizon. DOE may consider constructing a bivariate plot showing concentrations of an alternate set of parameters to verify that chemical signatures of each horizon are separate and distinct.

Appendix B

33. Commenting Organization: Ohio EPA
Section #: Figure B.1-3 Pg #: B-8
Comment: The total uranium concentration for STRM 4005 appears to be trending up since 2005. DOE should explain why this apparent trend is taking place.

Appendix C

Attachment C.2

34. Commenting Organization: Ohio EPA
Section #: C.2.1 Pg #: 3.2-1
Comment: Table C.2-1 indicates a population dose from air inhalation as zero "0.000" while the footnote indicates that particulate monitoring for the air inhalation pathway was discontinued in 2010. Change the table to indicate no data available because "no data" does not mean zero.

Appendix D

35. Commenting Organization: Ohio EPA
Section #: Table D-6 Pg #: D-10
Comment: The FQAI for all three prairies has declined since 2004. This seems to correspond with the decline in the number of native species in each prairie. How does the species diversity in these prairies compare to a reference prairie?

36. Commenting Organization: Ohio EPA
Section #: Table D-7 thru D-34 Pg #: D-11 thru D-38
Comment: The summary data at the top of each page, "Percent Native" does not match the "Native Species" relative frequency percentage at the bottom of each page. Explain how each number was calculated.

37. Commenting Organization: Ohio EPA
Section #: Table D-3A thru W Pg #: D-45 thru D-56
Comment: Each of the graphs indicate questionable data from approximately September 2010 to November 2010. The "flat lines" during this period are not consistent with the rest of the year. There appears to be some issues with data recording during dry months.

Responses to Ohio EPA Comments on the Fernald Preserve, 2010 Site Environmental Report May 2011

Summary

1. Commenting Organization: Ohio EPA
   Section #: General Comment Pg #: na
   Comment: The debris tracking sheet should be included with the inspection data on the DOE web site (http://www.lm.doe.gov/Fernald/reports/) and submitted to regulators along with the quarterly inspection reports. Debris tracking is part of the inspection process and should be included with the other documentation. The debris tracking spreadsheet was previously provided to regulators as part of the monthly conference call information; however there is currently not a mechanism to review these other than by regularly requesting them.

   Response: The debris tracking sheet (started in March 2007) shall be submitted to Ohio EPA quarterly, in conjunction with site inspection reports. Following years of inspections and specific surveys, site personnel are relatively familiar with on-property areas that have a high concentration of debris. These areas include portions of the former production and former waste pits areas. Public access was designed to avoid these areas that contain high occurrences of debris. For site inspection forms, the current approach of identifying individual pieces of debris in unexpected locations is an appropriate level of documentation. DOE will provide summary metrics within the text of quarterly inspection reports that describe disposition of debris. The total pieces of debris found and the total pieces of debris that were contaminated will be reported in each quarterly inspection report.

   Action: As stated in the response.

2. Commenting Organization:
   Ohio EPA Section #: 3.3.1.1 Pg #: 3-12
   Comment: The text states that uranium discharge limits can now be achieved without groundwater treatment. CAWWT is an asset to the site. The pumping strategy may need to be changed in order to achieve final aquifer remediation levels. DOE should thoroughly investigate whether the CAWWT will be needed and/or be utilized to optimize uranium capture in the future. Additionally, increased rainfall may raise the aquifer levels into the currently unsaturated zones of the aquifer. This may increase the concentrations of uranium in water extracted from the aquifer. DOE should thoroughly investigate whether treatment will be necessary in the future.

   Response: Comment acknowledged.

   Action: Any decision regarding the future need for groundwater treatment will carefully consider the issues presented in this comment (i.e., future efforts to optimize uranium capture and clean up challenges presented by the presence of contamination in the vadose zone beneath former source areas).

3. Commenting Organization: Ohio EPA
   Section #: Table 2-1 Pg #: 2-11
   Comment: Delete the last sentence in second column, "The trustees interacted with the FCAB and CRO." Update to add current interaction with FCA.

   Response: Agree.

   Action: The text in Table 2-1 will be revised in the 2011 SER.

4. Commenting Organization: Ohio EPA
   Section #: 6.2 Pg #: 6-14
   Comment: In the 3rd sentence of the first paragraph add "contaminated debris" to the list of what is documented in the site inspections.

   Response: The presence of debris and trash is noted during site inspections.

   Action: The text in Section 6.2 of the 2011 SER will be revised accordingly.

5. Commenting Organization: Ohio EPA
   Section #: 6.3 Pg #: 6-14
   Comment: This section should direct readers on how to view inspection results, both on the web and in person. A specific web address and phone number/address should be provided. A reference to inspection findings and the debris tracking sheet in appendix should be made here.

   Response: This text shall be added to future SERs: "Quarterly inspection reports are posted on the Legacy Management website at http://www.lm.doe.gov/land/sites/oh/fernald/fernald.htm. The quarterly inspection reports can also be viewed online at the Fernald Preserve Visitors Center or by contacting S.M. Stoller Public Affairs at (513) 648-4026."
   Action: As stated in the response.

Appendices A Through D

6. Commenting Organization: Ohio EPA
   Section #: General Comment Pg #: na
   Comment: The nomenclature to identify "up gradient" and "down gradient" wells may not be accurate due to active pumping changing the natural flow around the site. Figures A.3-1 through A.3.4 indicate the flow of the aquifer as generally from northeast to southwest rather than west to east due to pumping. The "up gradient" and "down gradient" monitoring wells were design for west (up) to east (down) aquifer flow.

   Response: This issue is discussed in each sub-attachment of Attachment A.5. It is reported that OSDF GMA groundwater monitoring wells are positioned for post-aquifer remediation flow conditions, when flow directions will likely be from west to east. It is also reported that groundwater in the GMA in most of the area of the OSDF in 2010 was moving in a general direction of northeast to southwest in response to active groundwater remediation taking place to the west and southwest of the OSDF. To help the reader better conceptualize the temporal impact that the remediation is having on the natural flow gradient of the aquifer, a brief description of the non-pumping flow gradient will also be added to Attachment A.3 in future annual reports.

   Action: As stated in the response.

Appendix A

Attachment A.1

7. Commenting Organization: Ohio EPA
   Section #: A.1 Pg #: A.1-3 Line #: 24
   Comment: This statement may be premature given the concentration rebound issues observed in site monitoring wells during extended shutdowns.

   Response: This statement is not considered premature. It is based on operation of the aquifer remediation system according to specifications of the Waste Storage Area (Phase II) Remediation Design.

   Action: None.

8. Commenting Organization: Ohio EPA
   Section #: A.1 Pg #: A.1-4 Line #: 14
   Comment: The text notes that transport modeling results are shown on Figures A.1-10 through A.1-32 for each extraction well. These plots, however, only show the predicted concentrations for 2010 and beyond. The plots should also include the predicted concentrations for previous years.

   Response: Previous year's predictions can be added to the plots.

   Action: Previous year's predictions will be added to the plots in future SERs.

9. Commenting Organization: Ohio EPA
   Section #: A.1 Pg #: A.1-4 Line #: 36
   Comment: The table shows that, based on "data" (though not stated, it is assumed that the term "data" means the "best-fit" trend line through the measured concentration data), 10,261 pounds of uranium have been extracted by the pump and treat remedy since pumping began. The table also shows that, based on the 95 percent upper confidence level (95UCL) on the "data," an equal amount of uranium has been extracted. However, the estimate based on the 95UCL should exceed the estimate based on the mean because the 95UCL concentrations are an upper confidence level on the mean and, by definition therefore, are greater in value than the mean. DOE should account for this apparent inconsistency in terminology and associated extracted mass estimates.

   Response: The "total predicted pounds of uranium to be removed" is based on both actual and predicted values. The "net-pounds of uranium extracted through December 2010" (10,261 pounds) is an actual value. This actual value was calculated using measured uranium concentrations and flow rates from the pumping wells. "Predicted pounds of uranium to be extracted between 2011 and the end of the pump and treat stage of the aquifer remedy" is added to the actual value. The "predicted pounds of uranium to be extracted …" varies based on whether the prediction is based on data trends, model predictions, or 95% UCL trends. Please note that the predicted value based on the 95% UCL trend exceeds the predicted value for the data trend.

   Action: The table will be modified in future SERs to provide a clearer presentation of what is an actual value and what is a predicted value.

10. Commenting Organization: Ohio EPA
Section #: A.1 Pg #: A.1-4 Line #: 36
Comment: DOE should discuss how the model estimate for extracted mass shown in the table was derived. Given that a model-derived extracted mass to-date is provided, it is presumed that DOE has constructed a solute transport model based on initial concentrations measured in 1993 and that DOE ran the model forward in time to arrive at an estimate for extracted mass in 2010. Please provide simulated monthly concentrations for each extraction well from 1993 to the present so that the model estimate can be verified.

Response: This comment is similar to Comment 9 in that there is confusion as to what is being reported in the table. The "net pounds of uranium extracted through December 2010" is an actual value. It is not based on model predictions. The remediation system operates according to the Waste Storage Area (Phase II) Design. Initial conditions for the groundwater model used in this design were loaded with data collected through May 2, 2005. Model predicted monthly concentrations for the extraction wells are provided in Figures A.1-10 through A.1.32. As stated on Page A.1-4 of the SER, Figures A.1-10 through A.1-32 also show how modeled uranium concentration predictions relate to the measured and 95 % UCL data trends.

Action: None.

11. Commenting Organization: Ohio EPA
Section #: A.1.5 Pg #: A.1-5
Comment: In the column header line for Table A.1-1, "Uranium Removal Index" is footnoted with a "b." However, the information provided in this Footnote "b" defines the "NA" entry in the table. A footnote should be added to define Uranium Removal Index. Footnote "b" should be applied to the first appearance of "NA."

Response: The uranium removal index (the title of the column) is defined as pounds of uranium removed divided by the million gallons of water removed (lbs/M gal). The footnote "b" refers to the column in general. "NA" is used in the column to denote "not applicable". The uranium removal index shall be defined and footnoted in future SERs. Additionally, the first occurrence of "NA" in each affected table shall be footnoted.

Action: None.

Attachment A.2

12. Commenting Organization: Ohio EPA
Section #: A.2.0 Pg #: A.2-1 Line #: na
Comment: Ohio EPA understands that a smaller slot size sampler was used; however, Ohio EPA does not understand why this would cause the samples to be rejected. Provide further explanation on why the slot size would affect the analytic results.

Response: From a validation standpoint, the data was not rejected. Incomplete sampling profiles drove the decision to not use the data and to re-sample the locations. Many of the sampling depths at each location would not yield water to the probe. At first the lack of yield was attributed to tight zones in the aquifer. Continued lack of sample indicated that something was wrong with the probe itself. Since the objective of getting a representative profile was not achieved, the decision was made not to use the incomplete profile data, and to re-sample the locations with a correct sized mill slot.

Action: None.

13. Commenting Organization: Ohio EPA
Section #: A.2 Pg #: A.2-1 Line #: 43
Comment: As shown by Table A.2-12, 25 out of the 55 monitoring wells listed have either an up significant trend or have no significant trend. Pump and treat operations have been ongoing for 18 years; significant pumping commenced 13 years ago. With 45 percent of monitoring wells showing either an up-trend or no significant trend after years of remedy operation, the model-estimated completion date of 2023 (12 years from now) appears to be in question.

Response: The completion date of 2023 is a model prediction, and all model predictions have some degree of uncertainty. The prediction appears to be reasonable based on regression trends of the uranium concentration data measured at the extraction wells (see Figures A.1-10 through A.1-32). As suggested by the EPA, DOE brackets the estimated time for cleanup with a worst case scenario based on the 95% UCL. At Fernald, this worst case estimate does not appear to be reasonable, but it serves as a reminder of the uncertainty that is associated with pump-and-treat cleanup operations in general.

The significance of "up-trend" wells needs to be evaluated in context to location. Contamination drawn to the extraction wells can result in increasing concentrations at monitoring wells if they are located between high concentration areas and the extraction wells.

In the recently completed CERCLA 5-year review of the Fernald Preserve, three issues are identified that have the potential to extend the aquifer remediation past modeled predicted cleanup dates;

1) Sorbed uranium contamination in the vadose zone
2) Stagnation zones within the uranium plume
3) Preferential flushing pathways within the uranium plume.

As the remedy progresses, each of these issues may need to be evaluated further to achieve the most efficient and effective clean up.

Action: As stated in the response.

14. Commenting Organization: Ohio EPA
Section #: A.2 Pg #: A.2-5 Line #: 34
Comment: Given that the uranium concentration data from site monitoring wells suggests that the aquifer cleanup may take a longer time than the model originally predicted, DOE's conclusion that flushing the SSOD with clean water is of marginal benefit now appears to lack credibility. DOE should, therefore, consider maintaining the flow of clean water in the SSOD or revise the model sufficiently so that the model is reliably able to show that this activity is unbeneficial (or beneficial) to the cleanup operation.

Response: This comment discussed two issues; 1) the credibility of groundwater modeling used to demonstrate the impact that flushing the SSOD with clean water has on the aquifer remedy, and 2) Maintaining the flow of clean water in the SSOD or revising the groundwater model.

In regards to issue 1, DOE disagrees that the credibility of groundwater modeling used to demonstrate the impact of flushing the SSOD with clean water appears to be questionable. This modeling effort (reported in the Groundwater Remedy Evaluation and Field Verification Plan in 2004) was approved by both the EPA and Ohio EPA. The modeling indicated that an induced recharge of 500 gpm to the aquifer through the SSOD would decrease the model predicted cleanup time for the aquifer by one year (minimal impact). A cost analysis indicated that the minimal impact did not make the operation cost-effective. Subsequent discussions with EPA and OEPA led to an agreement to a scaled down version of the operation. Clean water is being pumped into the SSOD to supplement natural storm water runoff in an attempt to accelerate remediation of the South Plume. Three existing water supply wells on the east side of the site are utilized to deliver as much clean groundwater as is needed to maintain a flow of approximately 500 gpm into the SSOD.

Pumping of clean water into the SSOD did not begin until December of 2006 because the water from the supply wells was needed for dust suppression to support site closure activities. Pumping of clean water into the SSOD has therefore been ongoing for approximately 4.5 years. If the modeling was wrong, monitoring wells in the area should be cleaning up faster due to the added flushing relative to other areas of the aquifer where added flushing is not taking place. There is no evidence of this occurring, which supports the conclusion that the impact is minimal. Additionally, infiltration data collected since the project began, provides strong indications that most of the time only minor infiltration (much less than 500 gallons per minute) is occurring over the target area of the SSOD. The fact that the project is achieving far less than targeted infiltration rates provides additional evidence to question the value of the project.

In regards to issue 2, DOE has agreed to maintain flow into the SSOD until the wells, pumps, or motors are no longer serviceable. At that time, operations will be suspended, pending a determination that the groundwater remedy is benefiting from the operation.

Action: As stated in the response.

15. Commenting Organization: Ohio EPA
Section #: A.2 Pg #: A.2-5 Line #: 34
Comment: The text indicates that Well 42471 ceased pumping due to an electrical issue and that the LIMCP states that pumping will continue until the wells are no longer operable; DOE stops short of stating any action that it will take in response to this situation. Will DOE repair Well 42471 or will DOE plug and abandon this well? If DOE intends to plug this well, when will DOE perform this task?

Response: The LMICP actually states that the pumping will continue until the wells are no longer serviceable. There are no plans to plug and abandon Well 42471 at this time. There are no plans to repair Well 42471 at this time, as the other two supply wells continue to operate. See response to Comment 14.

Action: None.

16. Commenting Organization: Ohio EPA
Section #: A.2 Pg #: A.2-7 Line #: 11
Comment: In order to accurately reflect the model's predictive capability, the predicted concentrations used in the residuals analysis should be compared with the initial concentrations specified for the 2006 Waste Storage Area Design model. The initial concentrations for this model were based on the initial site wide concentrations measured in April 2005.

Response: This was done and reported in the 2005 SER, and also again in the second column of the table presented on page A.2-7 of the 2010 SER. Initial conditions are based on site wide concentrations measured through May 2, 2005.

Action: None.

17. Commenting Organization: Ohio EPA
Section #: A.2 Pg #: A.2-7 Line #: 14
Comment: As evidenced by the relatively large positive average residual, the model is generally under-predicting the true concentration. This too-rapid of a decline in predicted dissolved concentration is likely a function of the initialized plume having concentrations that are too low, inaccurate assumptions regarding the transition of uranium from the sorbed to the dissolved phase, and use of an uncalibrated transport model.

Response: DOE agrees that a positive average residual indicates that the model is under-predicting the true concentration. The amount of the under-prediction (2005 mean residual versus the 2010 mean residual) appears to have remained relatively stable (30.54 ug/L in 2005 compared to 29.42 ug/L in 2010). Several of the total uranium versus time plots presented in Figures A.1-10 through A.1-32 indicate that the difference between the model predicted concentration and the data predicted concentration (regression trend) continue to decrease slightly as the remedy progresses.

Action: None.

18. Commenting Organization: Ohio EPA
Section #: A.2 Pg #: A.2-17 Line #: Table A.2-13
Comment: The footnote to this table indicates that the residual analysis was only conducted using the wells from Layer 12, the top model layer. DOE should revise the residual analysis to include all available monitoring wells from all model layers.

Response: Concentration residuals are calculated for model layer 12 because most of the uranium plume is simulated in model layer 12.

Action: None.

Attachment A.3

19. Commenting Organization: Ohio EPA
Section #: A.3.1 Pg #: A.3-1
Comment: Untitled table at the bottom of the page. The table shows "X"s in various columns; however, there is no text to indicate that the "X"s represent that the wells were sampled or not sampled.

Response: The "X" designates the quarter(s) in which the location was dry; and therefore, was not sampled. In future SERs, the "X" will be replaced with "dry."

Action: As stated in the response.

20. Commenting Organization: Ohio EPA
Section #: A.3.1 Pg #: A.3-3
Comment: DOE's decision to eliminate cluster hydrographs from future SER reports is reasonable. DOE should indicate whether groundwater level data will continue to be collected and compiled for the Type 3 wells in future monitoring events.

Response: Water level data will continue to be collected (at least once a year) at the Type 3 wells that were used in the past for the cluster hydrographs. Cluster hydrographs will not be routinely prepared and reported.

Action: As stated in the response.

Attachment A.5

21. Commenting Organization: Ohio EPA
    Section #: A.5 Pg #: A.5-5 Line #: 34
    Comment: DOE should clarify how non-detect concentrations are handled in the summary statistics calculations shown in Tables A.5.1-1 through A.5.8-1. Specifically, DOE should summarize how are non-detects accounted for in calculation of mean concentrations (e.g., simple substitution of half of the MDL?). Also, how is it noted in these tables if the median concentration of a constituent for one of the cell monitoring horizons is a non-detect value?

    Response: The first part of this comment pertaining to how non-detections are handled in the summary statistics is similar to that addressed in comment 25, and is addressed by that comment response. It should be noted that non-detections are assigned a value of ½ the MDL through simple substitution before the calculation of means or medians. In regard to the last part of this comment, the designation of the median data point as a detected or non-detected value is not currently noted in the tables. The problem is that this designation is not always possible, because when the total number of samples is an even number, the median will not be a data point. It will be the average of the two middle values in the sample set.
    Action: As stated in the response.

22. Commenting Organization: Ohio EPA
    Section #: Attach. A.5 Pg #: A.5-7 Line #: 19
    Comment: EPA's 2008 Statistical Analysis of Groundwater Data at RCRA Facilities – Unified Guidance (Unified Guidance) suggests that only the CUSUM limit (h) be used; it is unnecessary to include the Shewart control limit (SCL) on the control charts.

    Response: Comment acknowledged. The software program being used at Fernald (ChemStat Version 6.3) automatically posts the Shewart control limit (SCL) on the control charts along with the CUSUM (h) limit. In future reports though, a declaration of "out of control" will be based on the CUSUM limit (h).

    Action: As stated in the response.

23. Commenting Organization: Ohio EPA
Section #: A.5 Pg #: A.5-12 Line #: 20
Comment: Although the standing water may not affect system operation, it may significantly impact the statistical independence of the monitoring data being collected. An implicit assumption of the OSDF monitoring program is that liquids sampled during a given quarter enter each respective system during that quarter. The presence of standing water introduces the possibility that sampled liquids are from a standing volume accumulated over many quarters. Mixing of this volume calls into question the independence of samples from different times. DOE should indicate the percentage of the LCS and LDS for each cell that contain standing water and assess the impact of this standing water on sample integrity.

Response: As shown by the camera survey conducted in September of 2010, standing water is present in the LCS or LDS. The presence of standing water introduces the possibility that collected water samples may not uniquely represent the water quality of the water that entered the system between sampling events. The collected samples though will represent how the overall water quality of the system is changing over time, and this is the objective of the monitoring. When the water quality data is coupled with the flow data potential communication between the LCS and LDS can be detected.

Geosyntec provided a review of the results of the September 2010 camera survey in a report titled: "*Review of Video Survey for the Leachate Collection and Leak Detection System for Cells 1 through 8 at the Fernald Preserve" dated 2-11-11.* DOE held an informal discussion with Ohio EPA regarding the findings contained in the Geosyntec report, and discussed continued sampling strategies for the LCS and LDS during a meeting on September 14, 2011. The Geosyntec report was sent to Ohio EPA via email on September 15, 2011.

Action: As stated in the response.

24. Commenting Organization: Ohio EPA
Section #: A.5 Pg #: Table A.5-3
Comment: The explanatory text at the bottom of this table needs to be clarified. Specifically, more detailed explanation of the "25%" and shaded cell table entries is needed. For example, "25%" denotes "has been detected at least 25% of the time, but not in 2010." Does this mean that the analyte was not detected at all in 2010 or not detected 25% of the time in 2010?

Response: The "25%" indentifies that the analyte was not detected in 2010; but it has been detected at least 25% of the time in the past. Shading is used to identify if the analyte detected in 2010 has also been detected 25% of the time in the past.

Action: In future SERs, the explanatory text at the bottom of this table will be expanded to better differentiate between what applies to past years and what applies to just the current year.

25. Commenting Organization: Ohio EPA
Section #: A.5 Pg #: Table A.5.1-1
Comment: The footnotes for this table for Cell 1 and for the equivalent tables for Cells 2 through 8 are missing critical information and need revision. Footnote "c" should discuss how nondetects are handled in the calculations of the average, median, and standard deviation. Footnote "c" should also indicate that the average is calculated for samples with n>=3 and standard deviation is calculated for samples with n>=4. Footnote "d" should include average and standard deviation in the list of potential parameters flagged "insuff." Footnote "e" should discuss the use of the Shapiro Francia method for testing normality in datasets with n>50 and should indicate that distribution testing is conducted on samples with n>=3. Footnote "f" should indicate that trend testing is conducted on samples with n>=4. Footnote "g" should indicate that serial correlation testing requires a sample with n>=6. Footnote "h" should indicate that outlier testing requires a sample with n>=4.

Response: DOE agrees with the comment and will include this information in future SERs.

Action: As stated in the response.

26. Commenting Organization: Ohio EPA
Section #: A.5 Pg #: Table A.5.1-1
Comment: Tables A.5.1-1 through A.5.8-1 identify the constituents having datasets with the requisite conditions for control charting (at least eight samples, normal or lognormal distribution, no serial correlation, and no trend). Inspection of these tables indicates that qualifying LDS datasets have been systematically excluded. Qualifying datasets include for Cell 1 TOC, boron, cobalt, lithium, nickel, and zinc; for Cell 2 Boron; for Cell 3 TOX, cobalt, iron, lithium, nickel, and sodium; for Cell 4 uranium, TOX, arsenic, nickel, and zinc; for Cell 5 TOX, iron, selenium, and zinc; for Cell 6 TOX, manganese, and selenium; for Cell 7 uranium, TDS, cobalt, lithium, and sodium; for Cell 8 manganese, nickel, selenium, and zinc. DOE should either provide control charts for these constituents or explain why they are excluded from analyses via control charts.

Response: Control charting is used at monitoring locations beneath the facility (HTW and GMA wells). The LDS is located within the facility.

Action: None.

27. Commenting Organization: Ohio EPA
Section #: A.5.2.1 Pg #: A.5-6
Comment: Data distribution and trends were checked with statistical tests with 95% confidence interval. When checking for serial correlation the statistical test was ran with 99% confidence interval. Why is the Von Neuman test ran at 99%?

Response: The statistical software used only provides a test at 99%.

Action: None.

28. Commenting Organization: Ohio EPA
Section #: A.5.2 Pg #: A.5.2-9, 12
Comment: Figure A.5.2-2 indicates that approximately 1 gallon of leachate was collected from the LDS of Cell 2. However, Figures A.5.2-6A, et al. do not indicate any analytical data was collected from this 1 gallon of leachate. Why were no analysis done?

Response: The one gallon of leachate that appears on Figure A.5.2-2 is attributed to instrument drift. Records indicate that the level indicators and transmitters in the LDS of Cell 2 underwent the annual preventive maintenance calibration in April. The instrument drifted between May and September. During that time no water was pumped from the LDS. The 0.91 gallons of water recorded by the instrument roughly correlates to a water depth of approximately 0.01 feet on the bottom of the LDS tank. A pump will automatically pump out the tank when the water level reaches 80% full (approximately 202 gallons). The automatic pump kicks off after pumping the volume of water down to a depth of approximately 0.2 feet. After each sampling event the system is manually pumped down until the pump breaks suction (approximate water depth of ¼ to ½ inch at the bottom of the tank).

Action: None.

29. Commenting Organization: Ohio EPA
Section #: Attach. A.5 Pg #: A.5.3-2 Line #: 12
Comment: As indicated in the EPA Unified Guidance, prior to updating control chart background data, Student's t-or Wilcoxon Rank Sum Test should be used to compare the in-control data to the background data. In addition, the CUSUM should be reset to zero since it will already have been affected by the compliance measurements now being added to background.

Response: Comment acknowledged. The ChemStat® software uses a default of eight samples to define the baseline. When background data is updated the EPA Uniformed Guidance will be consulted.

Action: As stated in response.

30. Commenting Organization: Ohio EPA
Section #: A.5.4.2 Pg #: A.5.4-3
Comment: In the last paragraph of this section and throughout this attachment "out of control" parameters are explained away because the bivariate plot of uranium and sodium indicate different liquid signatures. Ohio EPA has requested in the past and now, again, that both trilinear plots and Stiff diagrams be used demonstrate potential differences in chemical composition between leachate and the various zones being monitored. The uranium/sodium bivariate plot may not adequately address the changing water quality.

Response: Different bivariate plot combinations will be considered should the uranium/sodium combination no longer provide a conclusive interpretation. The use of trilinear and Stiff diagrams will be considered on an as needed basis.

Action: As stated in the response.

31. Commenting Organization: Ohio EPA
Section #: Attach. A.5 Pg #: A.5.6-2 Line #: 12
Comment: HTW data are missing from the table.

Response: It is correct that the table only presents LDS and GMA well data. The reference to "HTW" in the text above the table is a typo.

Action: None.

32. Commenting Organization: Ohio EPA
Section #: Attach. A.5 Pg #: A.5.8-4 Line #: 13
Comment: The clustering of the HTW and LDS data is a result of similar sodium concentrations in each horizon. DOE may consider constructing a bivariate plot showing concentrations of an alternate set of parameters to verify that chemical signatures of each horizon are separate and distinct.

Response: Agree. DOE will evaluate the use of an alternate set of parameters for the Cell 8 bivariate plot.

Action: As stated in the response.

Appendix B

33. Commenting Organization: Ohio EPA
    Section #: Figure B.1-3 Pg #: B-8
    Comment: The total uranium concentration for STRM 4005 appears to be trending up since 2005. DOE should explain why this apparent trend is taking place.

    Response: The cause of the increasing uranium concentration at location STRM 4005 is not known. The attached Figure 1 shows that the uranium concentration data since 2006 exhibits an increasing linear trend, with a couple of erratic spikes in 2007 and 2010. The most recent sample (March 2011) had a uranium concentration much lower than the spike measured in 2010 (22 ug/L versus 106 ug/L respectively).

    From a "cross media" impact to groundwater perspective the uranium concentration at STRM 4005 is a potential concern when it is above the groundwater Final Remediation Level (FRL) of 30 ug/L. The data indicates that FRL exceedances to date have been erratic; three since 2006 (12-10-2007, 78.5 ug/L, 6-2-2009, 43.6 ug/L and 11-22-2010, 106 ug/L).

    DOE recommends continued monitoring of this location for the time being. Should groundwater FRL exceedances become persistent (two consecutive FRL exceedances) then DOE will notify Ohio EPA and consider taking further action to determine the cause and impact of the exceedances. It should be noted that the GMA beneath this sampling location is within the capture zone of the groundwater remediation system. As long as the system is operating, periodic groundwater FRL exceedances in surface water do not present an immediate threat to human health and the environment.

    Action: As stated in the response.

Appendix C

<u>Attachment C.2</u>

34. Commenting Organization: Ohio EPA
    Section #: C.2.1 Pg #: 3.2-1
    Comment: Table C.2-1 indicates a population dose from air inhalation as zero "0.000" while the footnote indicates that particulate monitoring for the air inhalation pathway was discontinued in 2010. Change the table to indicate no data available because "no data" does not mean zero.

    Response: Agree.

    Action: Table C.2-1 will be revised in the 2011 SER.

Appendix D

35. Commenting Organization: Ohio EPA
    Section #: Table D-6 Pg #: D-10
    Comment: The FQAI for all three prairies has declined since 2004. This seems to correspond with the decline in the number of native species in each prairie. How does the species diversity in these prairies compare to a reference prairie?

    Response: Table D-5 provides the percent native and FQAI values for both baseline and reference site prairies. Restored communities are not close to resembling the reference conditions documented in 2001. However, as Table D-6 shows, the percent native composition of all three communities actually increased slightly in 2010. Since average CC values are also higher for two of the three areas, the lower FQAI is most likely attributed to the lower overall number of species observed in 2010. Section D.1.2 describes this issue in more detail.

    Action: None.

36. Commenting Organization: Ohio EPA
    Section #: Table D-7 thru D-34 Pg #: D-11 thru D-38
    Comment: The summary data at the top of each page, "Percent Native" does not match the "Native Species" relative frequency percentage at the bottom of each page. Explain how each number was calculated.

    Response: There are two different calculations for determining "percent native." The "Percent Native" that is listed at the top of Tables D-7 to D-34 is the number of native species observed divided into the total species richness of the sample area. The "Relative Frequency of Native Species" which is listed at the bottom of the tables is calculated by dividing the frequency (species per quadrat) of all native species into the sum of all species frequencies for the sample area. The two calculations are usually close to each other. However, the relative frequency calculation can diverge if a few species (native or non-native) dominate a community. Both values are usually discussed in the text.

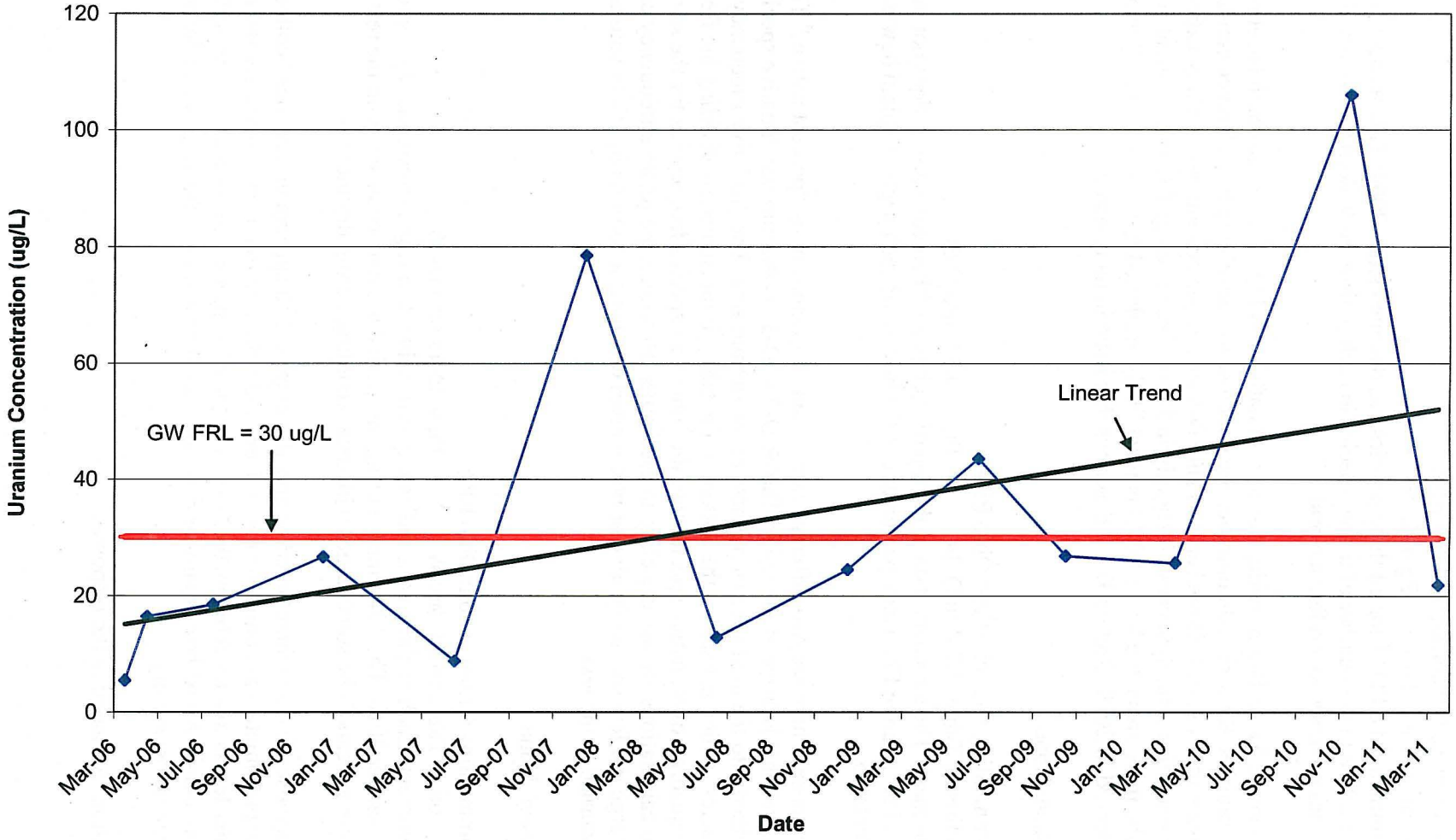
    Action: None.

37. Commenting Organization: Ohio EPA
    Section #: Table D-3A thru W Pg #: D-45 thru D-56
    Comment: Each of the graphs indicate questionable data from approximately September 2010 to November 2010. The "flat lines" during this period are not consistent with the rest of the year. There appears to be some issues with data recording during dry months.

    Response: Except where noted on specific graphs, data appears to have been collected accurately. The piezometers are only one meter deep, and a drought in late summer/early fall of 2010 reduced water levels to a level below the bottom of the piezometers. Section D.1.1.2 describes this issue in more detail. A text box or similar descriptor shall be added to the graphs that describes when the piezometers are dry.

    Action: As stated in the response.

Figure 1
Uranium Concentration at Location STRM 4005



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