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**TRANSMITTAL OF RESPONSE TO COMMENTS  
ON THE REPORT "CHARACTERIZATION OF  
BACKGROUND WATER QUALITY FOR STREAMS  
AND GROUNDWATER"**

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**DOE-2866-93  
DOE-FN/EPA  
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RESPONSES  
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**Department of Energy**  
**Fernald Environmental Management Project**  
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DOE-2866-93

Mr. James A. Saric, Remedial Project Director  
U.S. Environmental Protection Agency  
Region V - 5HRE-8J  
77 West Jackson Street  
Chicago, Illinois 60604

Mr. Graham E. Mitchell, Project Manager  
Ohio Environmental Protection Agency  
40 South Main Street  
Dayton, Ohio 45402

Dear Mr. Saric and Mr. Mitchell:

**TRANSMITTAL OF RESPONSE TO COMMENTS ON THE REPORT "CHARACTERIZATION OF  
BACKGROUND WATER QUALITY FOR STREAMS AND GROUNDWATER"**

- References: 1) Letter, J. A. Saric to J. R. Craig, "Conditional Approval of  
Characterization of Background for Streams and Groundwater,"  
dated June 10, 1993
- 2) Letter, G. E. Mitchell to J. R. Craig, "Comments on the  
Groundwater and Surface Water Background Study," dated June  
30, 1993

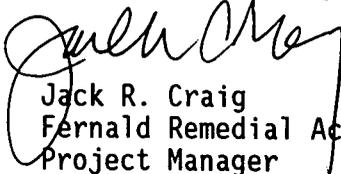
Enclosed are responses to United States Environmental Protection Agency (U.S. EPA) and Ohio Environmental Protection Agency (OEPA) comments on the report, *Characterization of Background Water Quality for Streams and Groundwater* (References 1 and 2). Under separate cover, the Department of Energy, Fernald Field Office (DOE-FN) will transmit responses to U.S. EPA's two comments on risk assessment. DOE-FN is responding to the risk assessment comments separately because they raise issues which go beyond the scope of the *Background* report.

The *Background* report will be revised at a later date once data from additional sampling of locations W1 (background location on the Great Miami River) and W5 (background location on Paddys Run) become available and the responses to U.S. EPA and OEPA comments are resolved.

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If you or your staff have questions, please contact me at (513) 648-3107 or Pete Yerace at (513) 648-3161.

Sincerely,

  
Jack R. Craig  
Fernald Remedial Action  
Project Manager

FN:Yerace

Enclosure: As Stated

cc w/enc:

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SPECIFIC COMMENTS

- 1 **Commenting Organization:** U.S. EPA **Commentor:** J. Saric  
**Section #:** Section 1.4.1 **Pg. #:** 1-9 **Line #:** 14

**Comment:** The text states that airborne contamination from FEMP may reach Sampling Point W1. However, isopleths of uranium concentrations in surface soil indicate airborne contamination up to the vicinity of Sampling Point W1. The text should be revised accordingly.

**Response:** Reference will be made to the specific studies which have investigated soil contamination northeast of the facility. The text will be modified to reflect the findings in those previous reports.

**Action:** Text will be modified as suggested.

- 2 **Commenting Organization:** U.S. EPA **Commentor:** J. Saric  
**Section #:** Section 2.1 and **Pg. #:** 2-1 **Line #:**  
 Tables A-1 and A-2

**Comment:** The report should indicate how the private wells sampled through the Environmental Monitoring Program and listed in Tables A-1 and A-2 correlate with the depths of the remedial investigation/feasibility study series wells.

**Response:** The total depth of wells sampled in the Environmental Monitoring Program will be ascertained, if possible, from existing files. These data for total depths will be included in Tables A-1 and A-2. To the extent possible, text and tables will also be modified to indicate to which well series (1000, 2000, 3000, or 4000) each private well belongs.

**Action:** Text and tables will be modified as suggested.

- 3 **Commenting Organization:** U.S. EPA **Commentor:** J. Saric  
**Section #:** 2.4, Figure 9, and **Pg. #:** 2-3 **Line #:**  
 Table A-5

**Comment:** Wells AL, EMR-6, EMR-7, and EMR-22 should be shown in Figure 9. Page 1 of Table A-5 shows 12 2000-series wells, while Pages 2 through 5 indicate that six of the wells are "unknown." This inconsistency should be corrected.

**Response:** The wells listed in Specific Comment No. 3 are already shown in Figure 9. The confusion arises as a result of the well identification and presentation in Table A-5 of Appendix A. Many wells in and around the FEMP have been referred to by different names. In this case, AL is the same as EMR-6, S is the same as EMR-7, and DG is the same as EMR-22. These wells are shown in on Figure 9 as AL, S, and DG. Table A-5 will be modified to show both names for each well.

**Action:** Table A-5 will be modified to eliminate confusion over well nomenclature.

4 **Commenting Organization:** U.S. EPA **Commentor:** J. Saric  
**Section #:** 3.2 **Pg. #:** 3-14 **Lines #:** 29-31

**Comment:** This sentence incorrectly states that all radionuclide values reported in this document are total concentrations from unfiltered samples. Table A-4 indicates that samples analyzed for metals and radionuclides were filtered; however data in Table A-4 were not used to calculate background. The sentence should be revised to reflect that all radionuclide data used to calculate background levels were from unfiltered samples.

**Response:** The text will be revised as suggested by reviewer. In addition, the text will be clarified regarding the nature of the non-RI/FS data and how it differs from the RI/FS data.

**Action:** Text will be modified as suggested.

5 **Commenting Organization:** U.S. EPA **Commentor:** J. Saric  
**Section #:** Appendix F, **Pg. #:** F-3 **Line #:**  
4<sup>th</sup> Equation

**Comment:** The equation should be corrected to include the standard deviation; it is given correctly on page F-23.

**Response:** DOE agrees the equation is incorrect, as noted by reviewer.

**Action:** Equation will be corrected.

6 **Commenting Organization:** U.S. EPA  
**Section #:** Appendix F

**Pg. #:** F-19

**Commentor:** J. Saric  
**Line #:**

**Comment:** The subscript "t" should indicate 35 degrees of freedom, not 29; it should appear " $t_{0.975,35}$ ."

**Response:** Comment noted.

**Action:** Correction will be made.

OHIO EPA COMMENTS

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1 **Commenting Organization:** Ohio EPA **Commentor:** M. Proffitt  
**Section #:** 3.1.2 **Pg #:** 3-2 **Line #:** 6

**Comment:** West of the FEMP should be changed to West of Paddys Run. West of the FEMP is not outside of the influence of the facility, whereas, west of Paddys Run is.

**Response:** Since Paddys Run flows from north to south through FEMP property, "west of the FEMP" is west of Paddys Run. However, many wells considered for use as background wells do lie between Paddys Run and the western property boundary. Therefore, the text will be changed as suggested by the reviewer.

**Action:** "West of the FEMP" will be changed to "West of Paddys Run."

2 **Commenting Organization:** Ohio EPA **Commentor:** M. Proffitt  
**Section #:** 3.1.2 **Pg #:** 3-2 **Line #:** 14

**Comment:** What evidence technically supports the decision to use these wells?

**Response:** The four wells referred to are located either outside the property boundary (Well 1060), along the southern boundary (Wells 1015 and 1733), or toward the southern edge of the property (Well 1065) away from the Production Area and other potential sources of contamination (see Figure 10). At this point in the document, these wells are listed for consideration only as possible background wells, and have not yet been accepted nor rejected for use.

After screening possible background wells against several criteria, only Wells 1060 and 1065 (among the four referred to in the comment) were selected to characterize background water quality. The screening process is described in the remaining sections of Chapter 3.

**Action:** Text will be expanded to explain why these wells are inferred to be outside the area of potential influence of the Production Area and other potential contaminant sources.

3 **Commenting Organization:** Ohio EPA  
**Section #:** 3.1.2 **Pg #:** 3-2

**Commentor:** M. Proffitt  
**Line #:** 27

**Comment:** Were these logs verified using field measurements?

**Response:** Geologic logs and well completion reports exist for all monitoring wells drilled specifically for the FEMP, so the total depth and formation(s) penetrated by each of these wells are known. Geologic logs and well construction information for most of the private wells were also gathered from existing records (see Table 2). No field verification of well construction information was performed specifically for this study.

**Action:** No action required.

4 **Commenting Organization:** Ohio EPA  
**Section #:** Table 1 **Pg #:** 3-3

**Commentor:** M. Proffitt  
**Line #:**

**Comment:** Which wells were excluded due to construction problems? How was construction tested and verified?

**Response:** Wells 1058 and 1124 were excluded because no geologic log or measurement of total depth could be located. No studies were performed in the field to validate construction characteristics of the private wells. However, it should be noted that the analytical data available for candidate background monitoring wells were reviewed and used as a selection criteria for wells actually used to calculate background concentrations for the FEMP. (Anomalous or erratic data is one indication that a well was poorly constructed.)

**Action:** No action required.

5 **Commenting Organization:** Ohio EPA  
**Section #:** 3.1.2 **Pg #:** 3-8

**Commentor:** M. Proffitt  
**Line #:** 14-23

**Comment:** Wells with an unknown screened interval should not be used in the background study.

**Response:** Wells 1058 and 1124 were eliminated for use as background wells because geologic logs, well completion information, or total depth measurement could not be located for these wells.

For two residential wells (2121 and 2122), located northeast of the FEMP (see Figure 11), the total depths of the wells are known, but the screened intervals are not available. These wells penetrate the Great Miami Aquifer only (i.e., the glacial overburden is not present), so there is no question that these two wells are screened in the Great Miami Aquifer. For two other wells (1059 and 1060; see Figure 10), the total depths are also known, but the screened intervals are not. These wells are shallower and penetrate only the glacial overburden, so there is no question concerning the formation in which these wells are completed.

The screened intervals of all other wells used to characterize background groundwater quality are known, and are shown on well completion logs included in Appendix B.

In summary, the screened intervals of four wells used to characterize background groundwater quality are not known, but the total depth of each well is known. Based on the local geology and recorded drilling depth at each of the four wells, the formation which each well penetrates is known conclusively. Knowledge of the exact screened interval depth is not a basis for rejecting a candidate if the formation from which groundwater is being drawn is known.

**Action:** No action required.

6	<b>Commenting Organization:</b> Ohio EPA <b>Section #:</b> 3.1.2	<b>Pg #:</b> 3-11	<b>Commentor:</b> M. Proffitt <b>Line #:</b> 9
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**Comment:** Which monitoring wells did not have sufficient Ion/Anion data? How were monitoring wells lacking sufficient Ion/Anion data tested in order to determine if the water quality data obtained from these wells was indeed representative of background water quality?

**Response:** All of the 30 wells used to characterize background groundwater quality had sufficient major cation and major anion data available to evaluate the representativeness of the wells. Wells displaying unusual water chemistry were deleted from the list of wells used to characterize background groundwater. The wells retained for characterizing background had a fairly narrow range of major cation and major anion concentrations.

**Action:** No action required.

7 **Commenting Organization:** Ohio EPA **Commentor:** M. Proffitt  
**Section #:** 3.1.2 **Pg #:** 3-11 **Line #:**

**Comment:** How were below detection limit (BDL) concentrations used in the calculations of trilinear diagrams?

**Response:** Only major cation and anion data are used to calculate charge balance and plot points on the trilinear diagrams. In some cases, the concentrations of the some ions were below the detection limit. (This is particularly true for ammonia, sulfate, and nitrate). In these cases, the concentration was set equal to zero. Because the concentrations were so low in comparison to the major ions present, they had no influence over the calculation of charge balance.

**Action:** The text will be modified to explain the treatment of nondetect data for calculation of charge balance error and plotting data on trilinear diagrams:

8 **Commenting Organization:** Ohio EPA **Commentor:** M. Proffitt  
**Section #:** 3.1.2 **Pg #:** 3-14 **Line #:** 10

**Comment:** If records do not indicate where and how the sample was taken, then the results should not be used. Field records should clearly indicate whether or not a sample has passed through a water softener. If these records do not exist the water quality data should be excluded from this investigation.

**Response:** The location and methods of collection for each water sample are known. However, the details of the indoor plumbing for each private residence is not known. Therefore, the data were scrutinized and any wells showing unusually high concentrations of sodium or chloride were not used to characterize background groundwater quality. (Elevated sodium and chloride concentrations are an indication that a water sample may have passed through a water softener.) Based on unusually high sodium and/or chloride values, Wells 2105, 3066, and 3679 were eliminated.

Additionally, it should be noted that the data provided by the sampling of the private monitoring wells contributes significantly to the total data pool available for background determination. In some cases, the elimination of the private monitoring well data would significantly shrink the available pool of data for an analyte. Unless the analytical data suggests that the sample passed through a water softener or filtration device (i.e., sodium and chloride concentrations are elevated; metals data are erratically different from the FEMP background monitoring wells) sampling data from

the private monitoring wells were not deleted from the database used to represent background for the FEMP.

**Action:** No action required at this time. This issue will be reconsidered when background monitoring data available from the CRU-5 Snapshot is available.

- 9 **Commenting Organization:** Ohio EPA **Commentor:** M. Proffitt  
**Section #:** 3.1.2 **Pg #:** 3-14 **Line #:**

**Comment:** The line "Samples collected for metals..." should read "Samples collected for dissolved metals..."

**Response:** Comment is noted.

**Action:** Text will be changed as suggested by the commentor.

- 10 **Commenting Organization:** Ohio EPA **Commentor:** M. Proffitt  
**Section #:** 4.2.2 **Pg #:** 4-2 **Line #:** 14

**Comment:** Was only data discarded or were the wells eliminated from the study? If the wells were kept, how were they plotted on trilinear diagrams? High detection limits could influence where the groundwater quality data is plotted on the diagram, depending upon how the BDL's are handled.

**Response:** Only nondetect data with high sample quantitation limits were excluded (see Table D-11). The rest of the data were kept for characterization purposes.

**Action:** No action required.

- 11 **Commenting Organization:** Ohio EPA **Commentor:** M. Proffitt  
**Section #:** 4.2.3 **Pg #:** 4-4 **Line #:** 3-4

**Comment:** What guidance was this based upon?

**Response:** EPA guidance does not state specifically what to do in cases where a data set does not rigorously qualify as fitting a normal or lognormal distribution. The EPA does not even specify what statistical test should be used to check for normality or lognormality. However, guidance presented in the "Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities,

Interim Final Guidance" (U.S. EPA, 1989) does discuss three different methods for testing normality. In 1992, an "Addendum to the Final Guidance" was issued by the EPA which criticized two of the methods previously considered (Coefficient of Variation, Chi-Square Test) as having potential problems. In addition, the Addendum discussed four alternative tests. In the "Background" report, the two most rigorous tests were used to test for normality--the Shapiro-Wilk and Shapiro-Francia tests. Although many of the data sets for water quality constituents failed one of these two tests, the calculated test statistics suggest that the sample populations were often fairly close to either the normal or lognormal distribution (i.e., the calculated test statistic was close to the critical statistic value needed to accept the hypothesis of normality).

In actuality, if these data groups would have been tested using a different statistical procedure, such as the Chi-Square Test or Coefficient-of-Skewness Test, many of them would probably have passed the tests for normality. Hence, it was assumed that these data groups were reasonably acceptable as normal or lognormal distributions, and parametric statistics were subsequently calculated. Median values and 95 percent upper confidence limits for the medians (i.e., nonparametric statistics) were not calculated.

**Action:** The text will be expanded to clarify the entire approach of normality testing and the assumptions used.