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RESPONSES TO U.S. EPA AND OEPA COMMENTS ON PROPOSED CHANGES RESULTING FROM THE 1999 ANNUAL REVIEW OF THE INTEGRATED ENVIRONMENTAL MONITORING PLAN, REVISION 1

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JANUARY 2000

U.S. DEPARTMENT OF ENERGY

RESPONSES TO U.S. EPA COMMENTS ON PROPOSED CHANGES RESULTING FROM THE 1999 ANNUAL REVIEW OF THE INTEGRATED ENVIRONMENTAL MONITORING PLAN

SPECIFIC COMMENTS

1. Commenting Organization: U.S. EPA Commentor: Saric
Section #: Summary Table Pg.#: 3 Line #: Not applicable (NA) Code: C
Original Comment #: 1

Comment: The text states that groundwater monitoring at several wells will be discontinued. However, sampling results presented in the 1998 integrated site environmental report indicate that the total uranium levels in monitoring wells 2434 and 3880 are low but erratic and that the wells should remain monitored. The total uranium levels in well 2880 are also low but have been steadily increasing over time, and the well should remain monitored.

Response: The U.S. Environmental Protection Agency (EPA) is requesting that routine Integrated Environmental Monitoring Plan (IEMP) monitoring continue at Monitoring Wells 2434, 3880, and 2880. The U.S. Department of Energy (DOE) requests that EPA re-consider their position. Further discussion is provided below.

Monitoring Well 2434: Attached are total uranium concentration versus time plots for Monitoring Wells 2434 and 3069 taken from the 1998 Integrated Site Environmental Report. Figures A.2-54 and A.2-89, respectively, are included in Attachment 1. Both of these wells are at the same location but screened at different depths. The plume at this location is at the Type 3 well depth as shown in Figure A.2-89. Monitoring Well 2434 is screened too shallow to properly monitor the uranium plume. The uranium concentration at the Type 3 well depth was slightly over 200 micrograms per liter (μg/L) at the end of 1998 versus a concentration of < 5 μg/L measured in Monitoring Well 2434 at the end of 1998. With the exception of one datum collected in 1997, the data collected from Monitoring Well 2434 do not appear to be erratic.

Monitoring Wells 2880 and 3880: Attached are total uranium concentration versus time plots for Monitoring Wells 2880 and 3880 taken from the 1998 Integrated Site Environmental Report. Figures A.2-70 and A.2-116, respectively, are included in Attachment 1. This comment is very similar to Comment #3 below. In response to that comment, DOE explains that the uranium plume at this location is migrating between the Type 2 and Type 3 well screens found in Monitoring Wells 2880 and 3880. Please refer to Comment Response #3. The Geoprobe® data provided in that comment response further illustrates the depth of the leading edge of the total uranium plume. Geoprobe® data collected at Locations 12334 and 12335 indicate that the plume is migrating between the well screens in Monitoring Wells 2880 and 3880 and is at a concentration of over 100 μg/L. Data collected from Monitoring Wells 2880 and 3880 at the end of 1998 (Figures A.2-70 and A.2-116, respectively) indicate uranium concentrations of less than 5 μg/L. Monitoring Wells 2880 and 3880 will not be plugged, and periodic grab samples can be collected if deemed appropriate, but DOE considers continued routine monitoring to be an ineffective use of resources.

If after reviewing this comment response, EPA still has concerns and believes that routine monitoring at Monitoring Wells 2434, 2880 and 3880 should continue, DOE suggests that this topic be discussed at an upcoming status meeting.

Action: DOE will continue monitoring Wells 2434, 2880, and 3880 until EPA concurs with deleting them from the routine IEMP monitoring program.

2. Commenting Organization: U.S. EPA Commentor: Saric
Section #: Attachment 1 Pg.#: NA Line #: NA Code: C
Original Comment #: 2

Comment: The text provides calculations for a revised estimate of uranium loading from uncontrolled surface runoff. An attempted replication of the calculations revealed some minor differences in the numbers. First, the unit conversion factor in Equation 1 is 0.008337. This factor was 0.0083454046 when recalculated from values of 3.785412 liters per gallon and 2.2046226 pounds per kilogram. Next, in applying Equation 2, the calculated results for "V" were greater than those listed in Table A-3, such as 7.40253 for STRM 4003 rather than the tabulated value of 7.361. Based on these differences, the estimated final loading value is 2.55 pounds per inch rather than 2.53 pounds per inch. The loading value should be recalculated after the conversion factors are checked. During recalculation, roundoff and truncation errors should be avoided by retaining an excessive number of significant figures until the final summation.

In addition, similar documentation should be provided for estimates used to establish the loading value of 6.25 pounds of total uranium discharged to Paddys Run. This documentation is necessary to allow evaluation of the current estimate.

Response: The conversion factors provided in Attachment 1 of the November 1 letter (DOE-0087-00) are consistent with those provided in previous annual integrated site environmental reports. The significant figures used for the data within the attachment have been reviewed and are also consistent with IEMP standard practices. Steps (Equations 1 through 3) and data tables within the attachment were provided to facilitate the agencies' review of the process used to calculate the new loading term. It is understood that rounding and truncation of numbers during the calculation process could reduce the conservativeness of the final loading term; however, DOE is unaware of any errors that have occurred during the calculation process.

Information pertaining to the development of the 6.25 loading value was summarized in the 1992 Site Environmental Report. "Based on a series of grab samples collected in various onsite drainage ditches that flow into Paddys Run, Fernald site personnel had developed a general estimate of 4.5 kg (10 pounds) of uranium in the runoff to Paddys Run for every inch of rain. In November 1992, this estimate was reduced to 2.8 kg (6.3 pounds). This change was brought about to reflect the completion of the Waste Pit Area Runoff Control Removal Action that now directs contaminated runoff from the waste pit area to the BSL and has eliminated that source of contamination to Paddys Run."

The original estimate of 10 pounds of uranium discharged to Paddys Run per inch of rainfall was articulated in an internal memorandum dated February 3, 1989 (letter No. 89-071). This original estimate used the same methodology and equations presented in Attachment 1 of the November letter (DOE-0087-00).

The average annual rainfall of 41 inches was used as the basis of the estimate. Loading was calculated for five sub-basins contributing to Paddys Run. An average total uranium concentration was used (or estimated) for each sub-basin. A runoff coefficient of 0.4 was assumed for each sub-basin. Loadings from each of the five sub-basins were summed, resulting in an estimate of 399.3 pounds of uranium discharged per year. Dividing this figure by an average annual rainfall of 41 inches yielded 9.73 pounds of uranium per inch of rainfall, which was subsequently rounded up to 10.

As identified above, the estimate was reduced from 10 to 6.25 pounds of uranium in November 1992 and the average annual rainfall was reduced to 40 inches. The estimate was updated based on the "Responsiveness Summary Engineering Evaluation/Cost Analysis Waste Pit", Comment Response #162, dated August 1990. The response to this comment provided an estimate that 150 pounds of uranium per year would be collected in the Bio-Surge Lagoon (rerouted from Paddys Run) due to the Waste Pit Area Runoff Control Project. Subtracting 150 pounds from the original estimate of 400 pounds and dividing by 40 inches of rainfall per year yields the estimate of 6.25 pounds of uranium per inch of rainfall ((400-150)/40)).

The current estimate provided in Attachment 1 is both more refined and more conservative in methodology in that:

- The uranium concentration used in 1989 was the average concentration, while the estimate provided in the IEMP Annual Review used the 95 percent upper confidence limit (UCL) of the mean.

- The original estimate from 1989 was based on a storm water sampling effort conducted by Roy F. Weston Inc. (October 18, 1988). Sub-basins selected for sampling were based on suspected areas of contamination and did not included off-property areas nor areas such as the existing on-site disposal facility borrow area, South Field area, and areas contributing through what is now called STRM 4004. The estimate provided in the IEMP Annual Review included all these areas. Therefore, the total contributing drainage area to Paddys Run in the IEMP estimate is approximately 811.2 acres compared to the total contributing drainage area of 444.5 acres in the February 1989 estimate.

- The February 1989 estimate assumed a runoff coefficient of 0.4 for all sub-basins. The estimate provided in the IEMP Annual Review were all slightly above 0.5 and were calculated by assuming a 0.5 coefficient for grassed areas and a 0.9 coefficient for estimated impervious areas within each basin.

Action: No action required.

RESPONSES TO OEPA COMMENTS ON PROPOSED CHANGES RESULTING FROM THE 1999 ANNUAL REVIEW OF THE INTEGRATED ENVIRONMENTAL MONITORING PLAN

3. Commenting Organization: OEPA — Commentor: HSI GeoTrans, Inc.
Section #: Summary Table, Row 1 — Pg.#: 3 — Line #: NA — Code: C
Original Comment #: 1

Comment: Based on inspection of the historical total uranium analysis results from wells 2434, 2544, 2880, 2881, 3880, 3881, and 21194, these wells are not positioned at the correct depth to monitor the uranium plume and therefore can be removed from the South Plume Module. As indicated in the technical information portion of Row 1 of Page 3 of the Summary Table, Monitoring Wells 6880 and 6881 have been installed to better define the leading edge of the South Plume. Direct push data substantiating the assertion that these wells are screened at the correct depths for plume monitoring should be provided via quarterly IEMP reporting.

Response: DOE acknowledges that the Ohio Environmental Protection Agency (OEPA) is in agreement with DOE's analysis that the screens in Monitoring Wells 2434, 2544, 2880, 2881, 3880, 3881, and 21194 are not positioned at the correct depth to properly monitor the uranium plume.

Direct push data substantiating that the screens in Monitoring Wells 6880 and 6881 are installed at the proper depth to monitor the uranium plume can be found in Appendix G of the Baseline Remedial Strategy Report, Remedial Design for Aquifer Restoration (Task 1). Specifically, data collected at Locations 12234 and 12235 illustrate that the leading edge of the uranium plume is migrating between the Type 2 and Type 3 well screen depths. Figure G-1 from the Baseline Remedial Strategy Report is included in Attachment 2. Figure G-1 identifies Locations 12234 and 12235 in relation to Monitoring Well Clusters 880 and 881. Monitoring Well 6880 was installed at the 880 cluster and Monitoring Well 6881 was installed at the 881 cluster. Figures G-15 and G-16 from the Baseline Remedial Strategy Report are also included in Attachment 2. Both of these figures identify total uranium concentration profiles versus depth for Geoprobe® Locations 12234 and 12235 and show that the leading edge of the uranium plume is migrating between the Type 2 and Type 3 well screen depths. The midpoints of the screens in Monitoring Wells 6880 and 6881 are positioned at the same elevation that the greatest uranium concentrations were detected at Geoprobe® Locations 12234 and 12235.

A copy of a facsimile sent to EPA and OEPA on August 27, 1999 is also included in Attachment 2. The facsimile explains why Monitoring Wells 6880 and 6881 are being drilled to replace Monitoring Wells 2880/3880 and 2881/3881 and that data collected at Geoprobe® Locations 12234 and 12235 were used to determine the depth of the new well screens.

Action. No action required.

4. Commenting Organization: OEPA — Commentor: HSI GeoTrans, Inc.
Section #: Summary Table, Row 5 — Pg.#: 3 — Line #: NA — Code: C
Original Comment #: 2

Comment: It is understood that wells need to be removed in order to proceed with remediation-related construction activity. The three wells marked for abandonment however, are important for delineating the total uranium plume in the waste storage area,

000005

particularly 2033 and 2034. Total uranium concentrations in these wells were 72.3 and 14.4 μg/L, respectively in 4Q98. As the proposed change results in a 20 percent reduction in the groundwater monitoring capacity in the waste storage area, DOE should propose alternative wells to compensate for this loss. Maintaining a viable monitoring network in waste storage area is important for monitoring the effects of the Waste Pits Remedial Action Project on the total uranium plume in this portion of the site.

Response: DOE shares EPA's concern regarding the continued monitoring of plume conditions in the Great Miami Aquifer beneath the Waste Storage Area as surface remediation of the Waste Storage Area is in progress. Removal of the source of aquifer contamination in the Waste Storage Area will provide a great long term benefit to the aquifer remediation. Anything that can be done to expedite the source removal, including the removal of aquifer monitoring wells that will slow down surface operations, is being done. DOE will continue to monitor the aquifer with all available monitoring wells as surface remediation is in progress. This monitoring will be supplemented with Geoprobe® profile monitoring at selected locations as needed to support the design and implementation of the groundwater remedy in the Waste Storage Area. DOE is not sure that it is feasible to separate and quantify any potential impacts to the aquifer as a result of the Waste Pits Remedial Action. This is due to the fact that the portion of aquifer, beneath and just down gradient of the pits, has already been impacted. However, it is important to reiterate that DOE is committed to remediate the aquifer as agreed to in the Record of Decision for Remedial Actions at Operable Unit 5.

Action: DOE will assess the monitoring well situation following surface remediation, and will ensure that a proper monitoring system is installed to monitor progress of the aquifer remediation.

5. Commenting Organization: OEPA — Commentor: HSI GeoTrans, Inc.
Section #: Summary Table, Row 1 — Pg.#: 4 — Line #: NA — Code: C
Original Comment #: 3

Comment: DOE should continue to monitor the Type 3 wells. The water level data generated are important for demonstrating capture of the deeper portions of the plume. Based on 1Q99 data, four Type 3 wells (not including the South Plume Extraction Module wells) have total uranium concentrations that significantly exceed the FRL. The concentrations in 3014, 3069, 3095, and 3125 range from 41 to 331 μg/L. At a minimum DOE should continue monitoring all Type 3 wells that fall within the 20 μg/L plume footprint plus some buffer distance (for example, 200 ft). By our estimation, this would include 38 wells compared to the 63 wells that are currently monitored for water levels as shown on Page 3-49 of the Integrated Environmental Monitoring Plan.

Response: This comment is similar to " Responses to U.S. EPA Comments on the Integrated Environmental Monitoring Status Report for Second Quarter 1999", Comment # 4. The response to Comment # 4 is provided here for convenience:

"As previously noted, DOE does not believe that Type 3 water level data adds any value to the interpretation of aquifer remediation progress. DOE has proposed that Type 3 water level data not be collected on a routine basis. In response to this request, EPA has proposed cutting back the collection of Type 3 water level data from quarterly to annually. OEPA wants to continue with a quarterly measurement effort, but decrease the number of locations from approximately 63 to 38. DOE suggests that this be discussed at an upcoming meeting. DOE will continue to collect and provide Type 3 water level data to the agencies until final resolution is reached."

Action: DOE, EPA, and OEPA will meet on this topic to reach a resolution.

6. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section #: Summary Table, Row 3 Pg.#: 4 Line #: N/A Code: C
Original Comment #: 4

Comment: Although the boroscope data has been problematic for interpretation of groundwater flow conditions in the Great Miami Aquifer, the device has been very useful as an independent line of evidence regarding the boundary of the capture zone for the South Plume Remediation Module. Often the evidence is inconclusive and reasonable reviewers will differ in its interpretation. Rather than complete abandonment of flow direction sensing, DOE should propose alternative technologies or alternative approaches for use of the boroscope. For example, although (as indicated in Attachment 3) the boroscope provides very localized information regarding tortuous groundwater flow paths, simultaneous (in a single day) boroscope measurements in a large number of wells would provide stronger evidence for the flow direction claims that are made. This monitoring activity could be conducted on, for example, an annual basis or when a significant change in extraction rates/locations is implemented. Currently, because so few wells are monitored with the boroscope, the localized deviations from the average flow direction do tend to confound interpretation. Simultaneous measurements in a large number of wells would average out these localized deviations.

Response: In general, DOE agrees with the commentor concerning the future use of the borescope. As explained in Attachment 3 of the November 1 letter (DOE-0087-00), DOE proposes to "...redirect the focus of the borescope from a routine groundwater remedy performance monitoring component of the Integrated Environmental Monitoring Plan (IEMP) to an investigation-specific application." However, DOE neither agrees with nor are the resources available to fulfill the commentor's suggestion that "simultaneous measurements in a large number of wells would average out these localized deviations." DOE is not as certain as the commentor that the results of such an endeavor would provide an averaging out of localized deviations. DOE currently has only one borescope and would therefore be unable to support the collection of the suggested measurements simultaneously in a large number of wells.

Action: DOE will continue to use the borescope as indicated in Attachment 3 of the Transmittal of Proposed Changes Resulting from the 1999 Annual Review of the Integrated Environmental Monitoring Plan, dated November 1, 1999.

7. Commenting Organization: Ohio EPA Commentor: DSW
Section #: Attachment 1 Pg.#: 4 Line #: STRM 4005 Code: E
Original Comment #: 5

Comment: This states that sample location STRM 4005 had 31 sample results and Table A-1 shows 33 results for STRM 4005. Were the 33 results in Table A-1 used or were only 31 results used as indicated in this section?

Response: The original data set of 33 sample results was reduced to 31 using the data preparation rules on page 2 of Attachment 1. When more than one result existed for a single location on the same date, the maximum result was used according to Rule 3. For example, more than one sample per day was collected from STRM 4005 on 7/22/97 and 8/22/97. Therefore, the maximum result from each of these days at this location was included in the data set. This left 31 samples in the data set for statistical analysis.

Action: No action required.

8. Commenting Organization: Ohio EPA Commentor: DSW
Section #: Attachment 1 Pg.#: 4 Line #: STRM 4005 Code: C
Original Comment #: 6

Comment: We cannot agree that the sample result of 170 μg/L can be discounted as an outlier. No data point should be rejected as an outlier if it is reasonably likely to be a valid result. This is not the case with the sample from STRM 4005. This is located in the pilot plant drainage ditch which has had levels of total uranium over 2000 μg/L as recently as 1996. Although the sump was installed, it is plausible to have a result of 170 μg/L in 1997. In addition this drainage also receives flow from the construction of the road around the silos and the activity around the loading of the first soil pile into the rail cars at the waste pits. In short, a result of 170 μg/L is not unlikely at this location. According to USEPA, if an observation is statistically determined to be an outlier, the EPA suggests determining an explanation for this outlier before its exclusion from further analysis (US EPA 1992). If an explanation cannot be found, then the observation should be treated as an extreme but valid measurement and it should be in further analysis (US EPA 1992) (Environmental Protection Agency,: 1992, Statistical Training Course for Ground-Water Monitoring Data Analysis, EPA/530-R-93-003, Office of Solid Waste, Washington, D.C.). This data point should be included in the analysis.

Response: While the statistical tests indicate that the 170 μg/L result is a potential outlier, DOE agrees that the result should not be totally discounted based on historical data and remediation activities in the drainage area. Therefore, it has been included in the data set used for statistical analysis (refer to the updated version of Attachment 1 [now Attachment 3] included with this comment response document). All calculated results and information that were impacted by the inclusion of this data point are either redlined or struck out, where appropriate. It should be noted that background information pertaining to outlier detection (within Section A.1.2) was not struck out but included for informational purposes.

Action: Attachment 1 has been updated with the inclusion of the 170 μg/L result and has been provided with this comment response document as Attachment 3. The loading term to determine the pounds of total uranium released per inch of rainfall has been included in Attachment 3.

9. Commenting Organization: Ohio EPA Commentor: DSW
Section #: Attachment 1 Pg.#: 8-9 Line #: Table A-1 Code: C
Original Comment #: 7

Comment: This table appears to contain data that was never submitted to Ohio EPA. The data received by Ohio EPA (1997, 1998, and 1999 to date) has 16 results for total uranium from STRM 4005, one result for total uranium from STRM 4006 and no total uranium results for STRM 4003 or STRM 4004. This table shows six total uranium samples for STRM 4003, five for STRM 4004, 33 for STRM 4005, and seven for STRM 4006. Why was this data never included in the data sent to Ohio EPA?

Response: DOE has investigated all data disks associated with the IEMP quarterly status reports and annual integrated site environmental reports that have been previously transmitted to the agencies. Table B-1, which is included with this comment response document as Attachment 4, is a duplicate of the original table (Table A-1) which was provided in Attachment 1 of the letter (DOE-0087-00) dated November 1 from DOE to EPA and OEPA. However, highlighting has been added to emphasize the data that DOE has not previously sent to the agencies. The data are mainly limited to 1998 total uranium results from storm water outfall locations STRM 4003, 4004, and 4006. The data were not sent to the agencies because total uranium analyses at these locations was not an IEMP requirement in 1998 (refer to IEMP, Revision 0). The only result that was inadvertently not transmitted to the agencies was a December 1998 total uranium result from STRM 4005. In regard to the other missing results identified by OEPA, total uranium results for sample location W10DD (pre-IEMP) were transmitted with the very first IEMP quarterly status report (refer to the Integrated Environmental Monitoring Status Report for Third Quarter 1997), which is the same as STRM 4005. Because sample location names W10DD and 4005 represented the same sampling location, W10DD was eliminated during the development of the IEMP. All subsequent data from this sampling location has been reported under the name 4005. This action was identified in various IEMP documents including the 1997 Integrated Site Environmental Report (refer to Table B.1-1 in Volume 1). The agencies should have all other data associated with STRM 4003, 4004, 4005, and 4006.

Action: No action required.

ATTACHMENT 1

FIGURES FOR JUSTIFICATION OF DISCONTINUING MONITORING OF MONITORING WELLS 2434, 2880, AND 3880
(Comment Response #1)

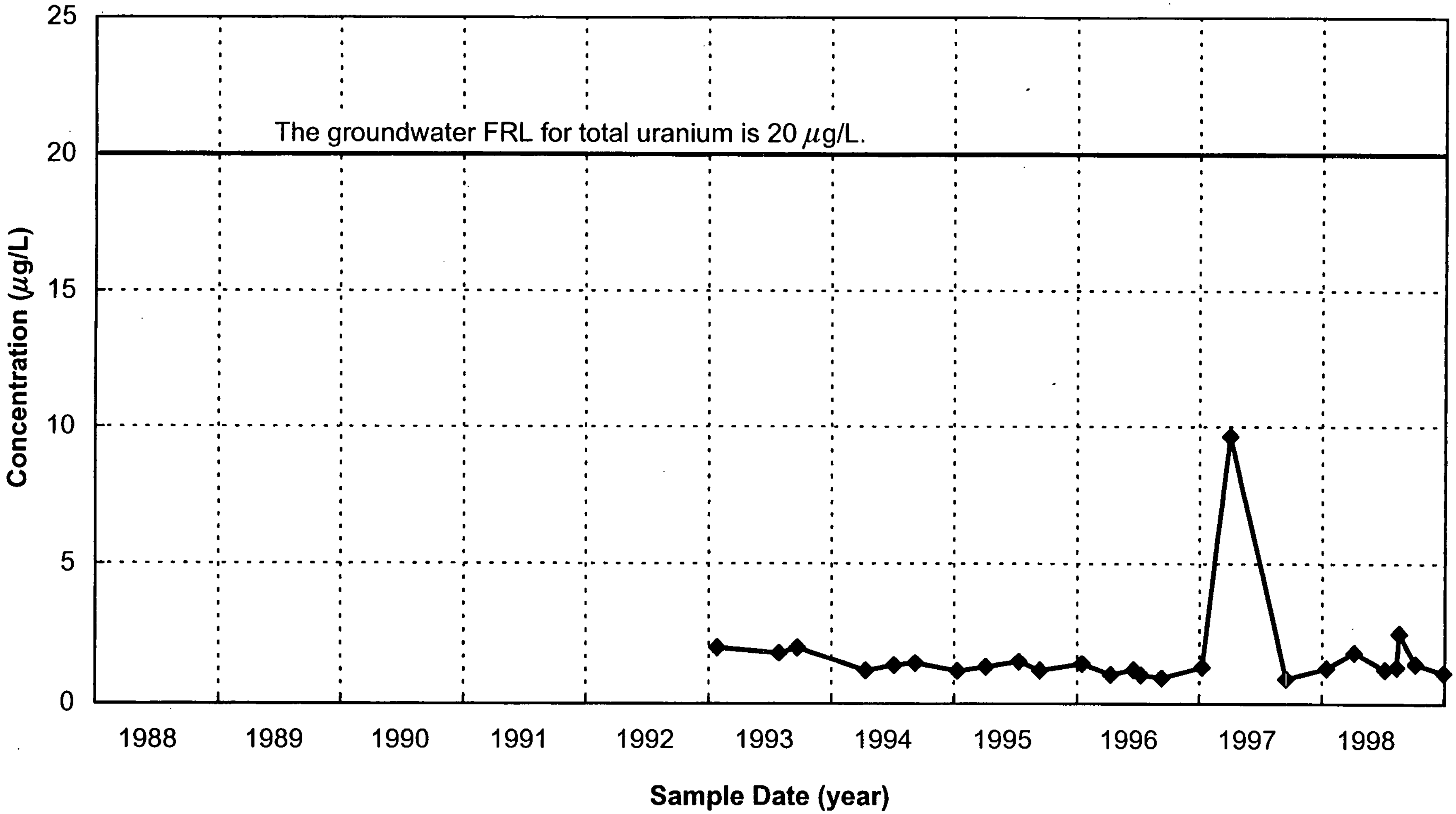

FIGURE A.2-54. TOTAL URANIUM CONCENTRATION VS. TIME PLOT
FOR MONITORING WELL 2434

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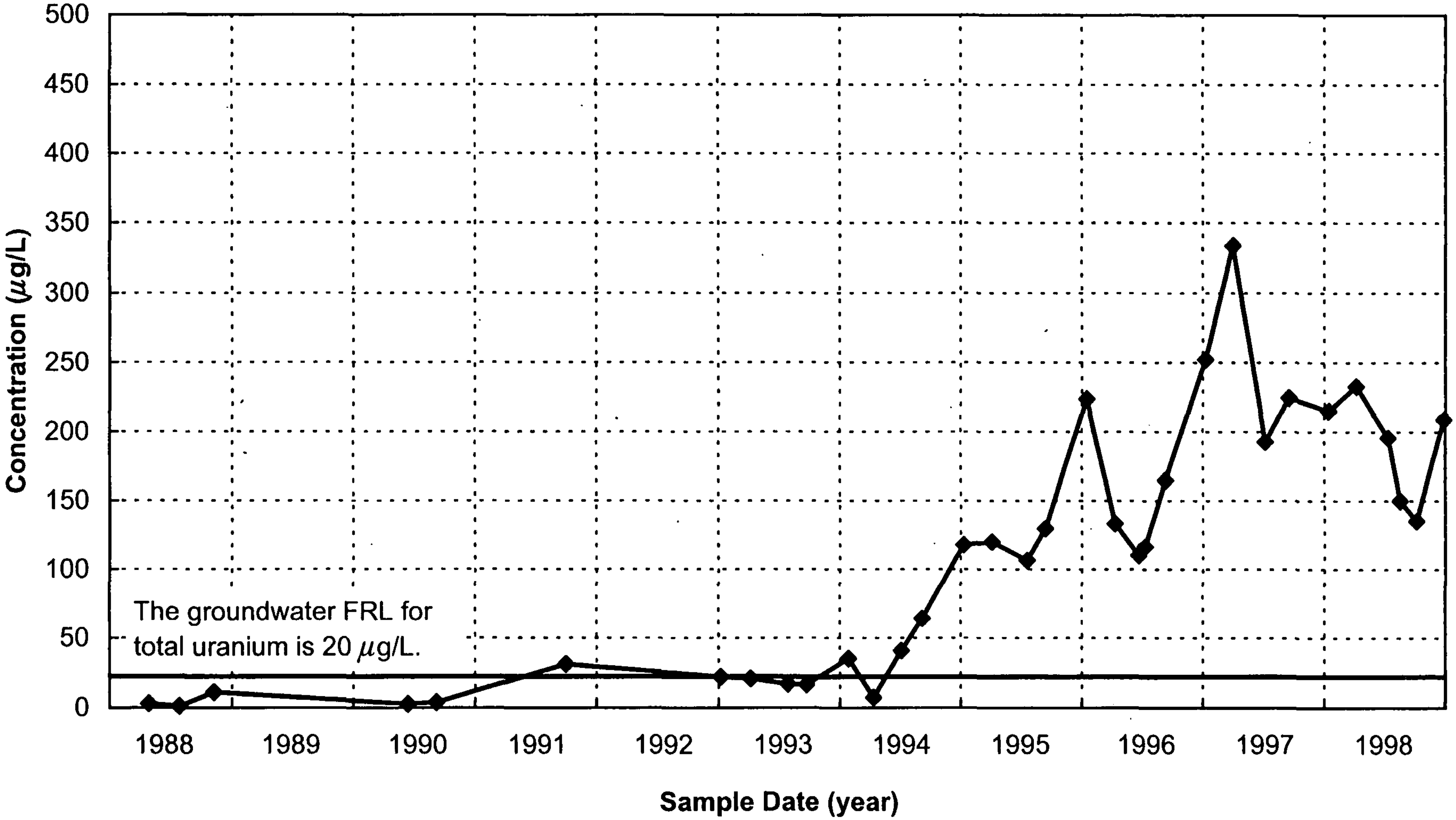

FIGURE A.2-89. TOTAL URANIUM CONCENTRATION VS. TIME PLOT
FOR MONITORING WELL 3069

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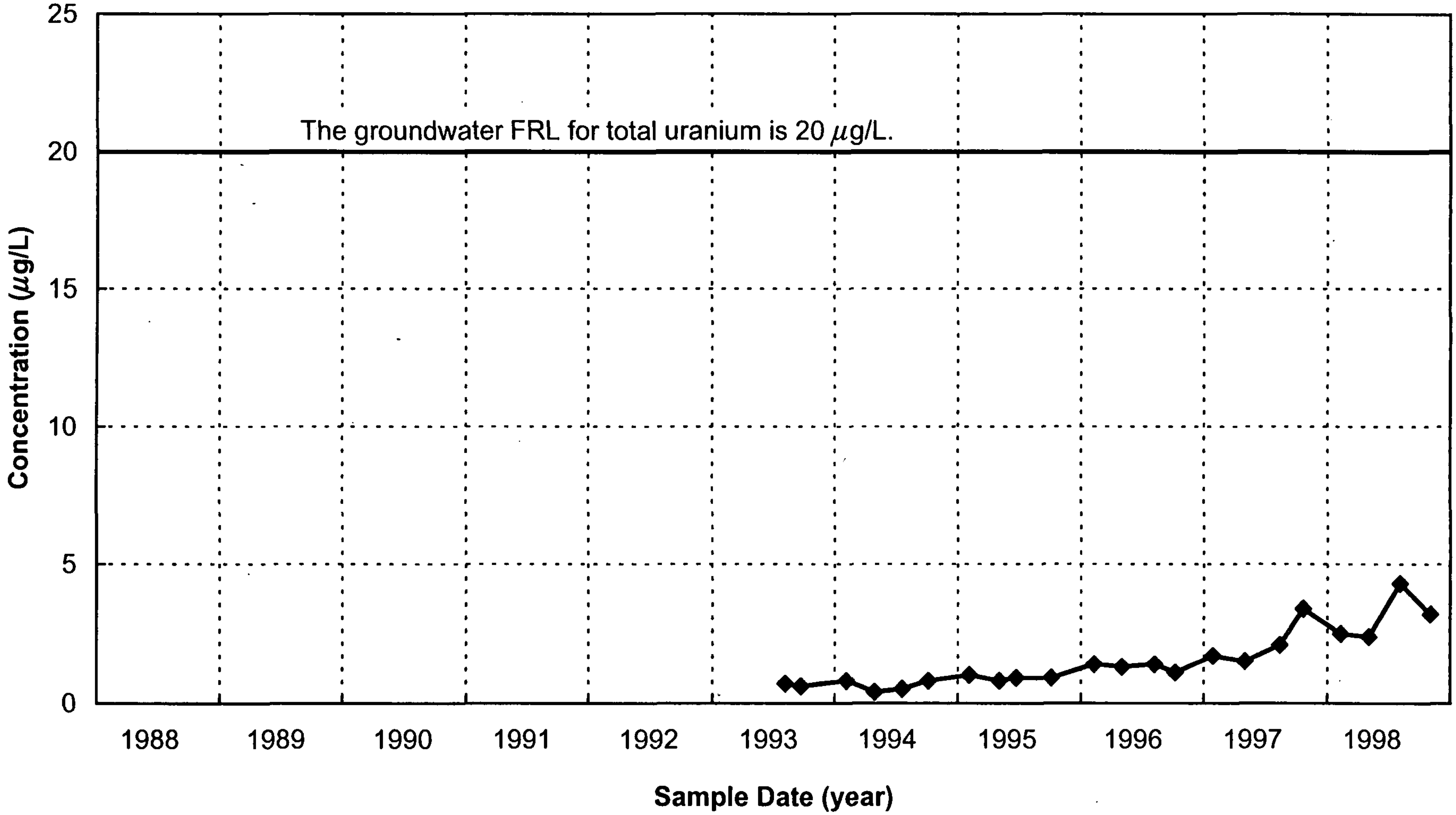

FIGURE A.2-70. TOTAL URANIUM CONCENTRATION VS. TIME PLOT
FOR MONITORING WELL 2880

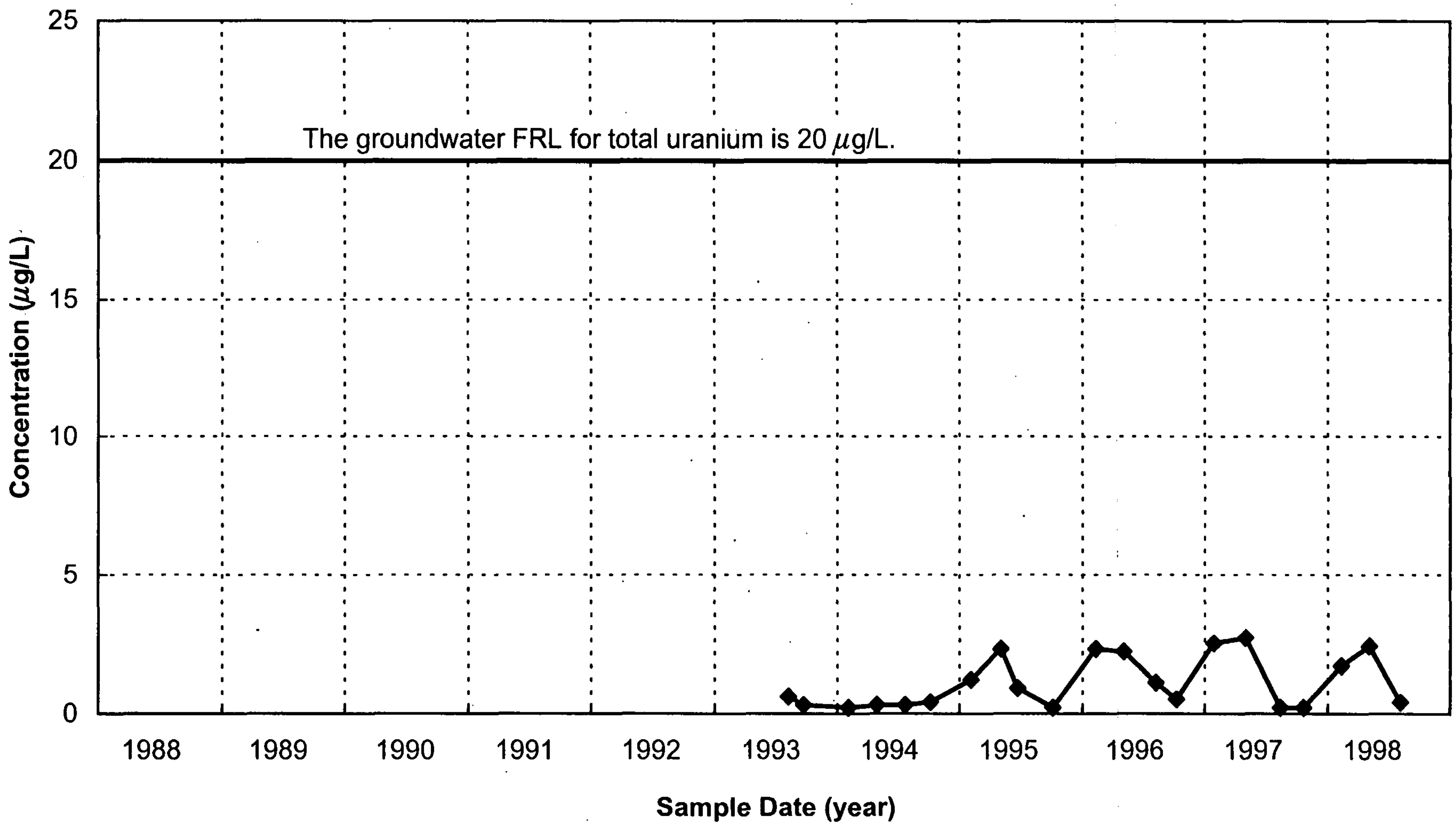

FIGURE A.2-116. TOTAL URANIUM CONCENTRATION VS. TIME PLOT FOR MONITORING WELL 3880

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ATTACHMENT 2

INFORMATION REGARDING WELL CHANGES AND DIRECT PUSH SAMPLING IN THE VICINITY OF MONITORING WELLS 6880 AND 6881 (COMMENT RESPONSE #3)

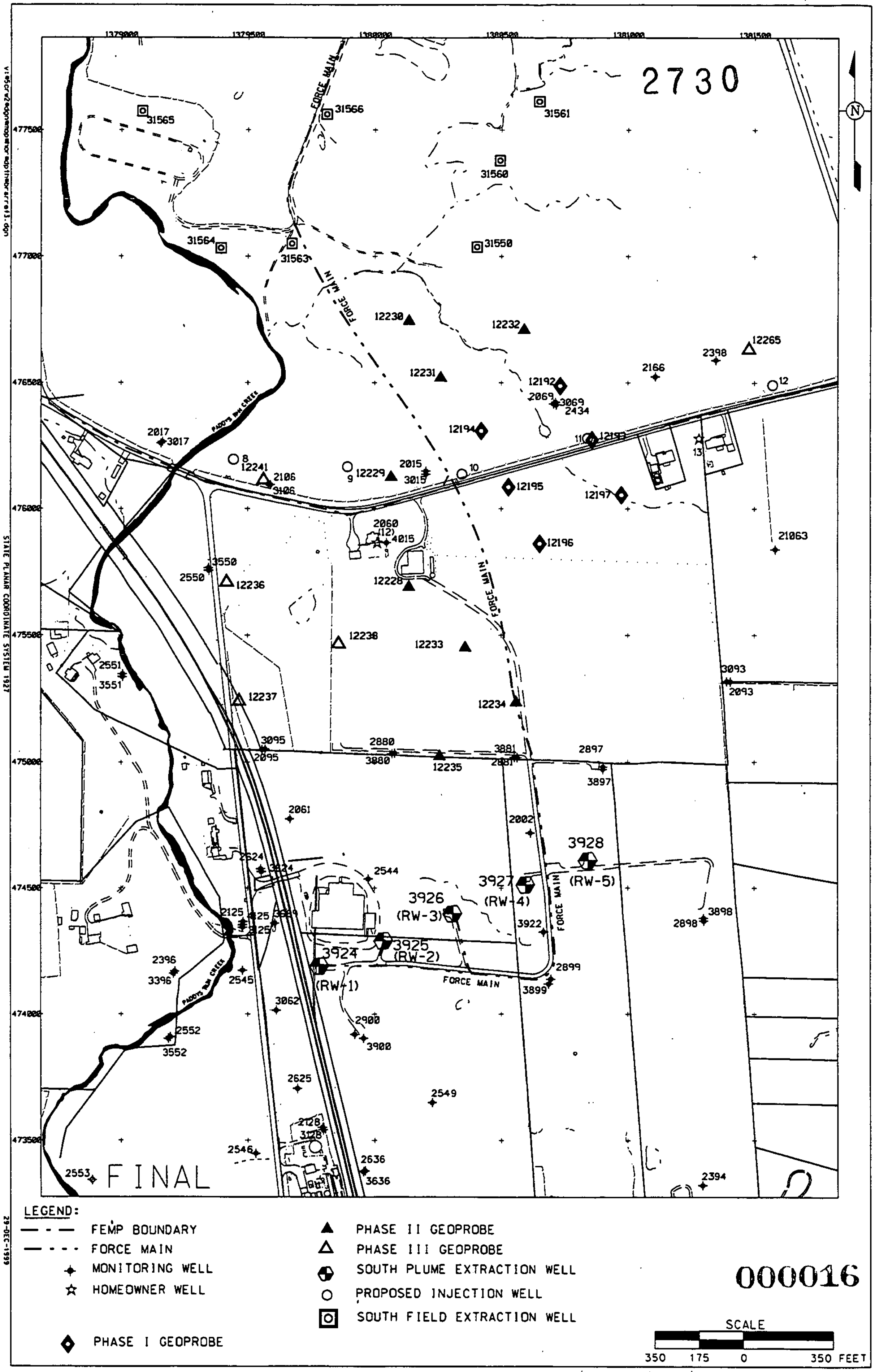
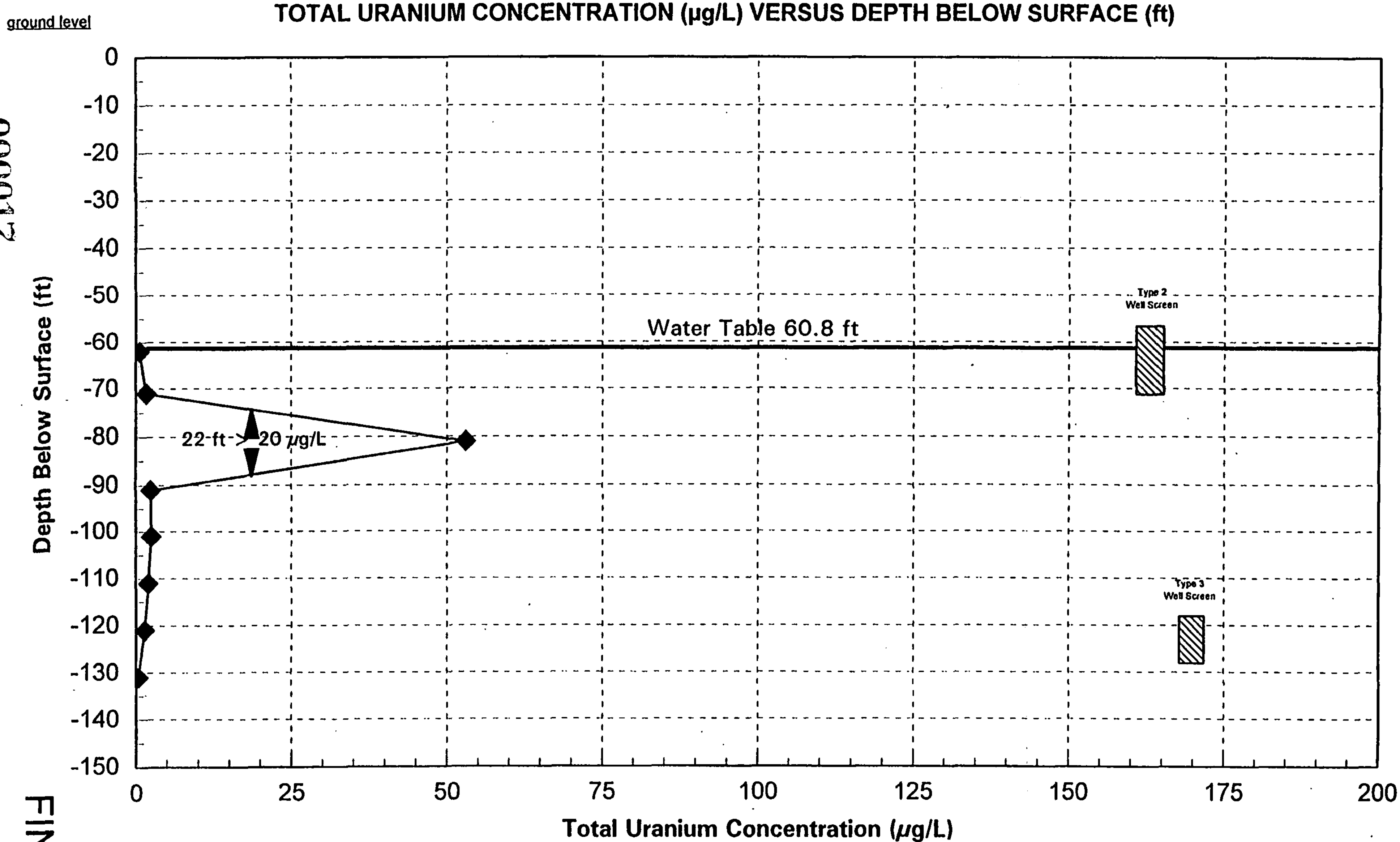


FIGURE G-1. GEOPROBE LOCATION MAP

FIGURE G-15
GEOPROBE™ RESULTS FOR LOCATION 12234
TOTAL URANIUM CONCENTRATION (µg/L) VERSUS DEPTH BELOW SURFACE (ft)



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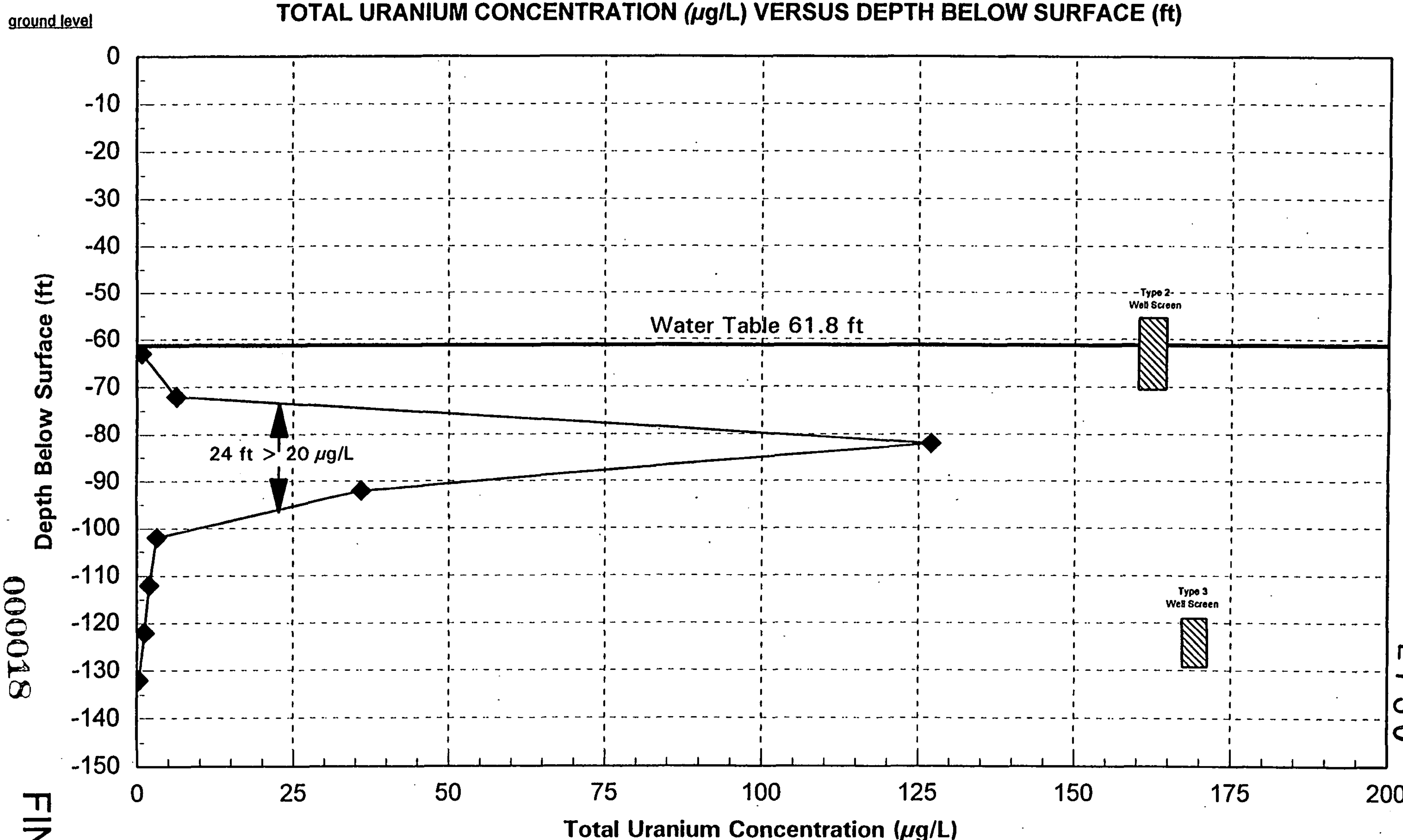
FINAL

FIGURE G-16
GEOPROBE™ RESULTS FOR LOCATION 12235
TOTAL URANIUM CONCENTRATION (μg/L) VERSUS DEPTH BELOW SURFACE (ft)



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FINAL

FLUOR DANIEL **FERNALD**

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Fluor Daniel Fernald, Inc.
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FACSIMILE LEAD SHEET

No. of Pages: 4
(Including Lead Sheet)

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MESSAGE

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Attached please find a figure and text pertaining to the installation of four additional monitoring wells. We will go over the attachments during the 8/31 conference call and answer questions you may have concerning the attached information.

DJB/WAH/JK/

c w/enclosure:

K. A. Broberg, FDF
R. J. Janke, DOE-FEMP
C. A. Smyser, FDF

Project File Record Storage #52490

1.0 INTRODUCTION

This Project Specific Plan (PSP) serves as the controlling document for the installation of four groundwater monitoring wells (62433, 62408, 62880 and 62881).

The locations of the four monitoring wells are shown in Figure 1. Two of the wells (62880 and 62881) will be located off property on an existing property easement that the DOE has with the current property owner. As explained below, the need to install these additional monitoring wells resulted from data collected using a direct-push sampling tool. These data were collected as part of remedial design and subsequent Remedy Performance Assessment Monitoring.

- Monitoring Well 62433 will be installed on property, next to Geoprobe™ Well 72433. This area of the plume was recently sampled, using conventional direct push sampling techniques. Analysis of the samples indicated that the total uranium groundwater concentration was as high as 373 μg/L. This new information indicated that the eastern edge of the 20 μg/L on-property total uranium plume was located a little further east than previously mapped and prompted the need for an additional groundwater monitoring well in the area to track remedy performance. As part of a demonstration, a Geoprobe™ prepacked monitoring well was installed. Prepacked Geoprobe™ wells have the potential for providing a very cost effective alternative to conventional monitoring wells used at the FEMP. However, analysis of groundwater samples collected from the Geoprobe™ well have indicated total uranium groundwater concentrations that are more than double the concentration detected in the conventional direct push samples collected from the same area. Monitoring Well 62433 will provide additional data needed to assess whether or not the Geoprobe™ well sample results or the conventional direct-push sample results are more representative of the aquifer.

- Monitoring Well 62408 will be installed on property, next to Direct Push Sampling Location 12408. The well will be used to track remedy performance along the eastern edge of the 20 μg/L on-property total uranium plume. This area of the plume was recently sampled, using conventional direct-push sampling techniques. Analysis of the direct-push samples indicated that the total uranium groundwater concentration was as high as 184 μg/L. This new information indicated that the eastern edge of the 20 μg/L on property total uranium plume was located a little further east than previously mapped and prompted the need for an additional groundwater monitoring well in the area to track remedy performance.

- Monitoring Well 6880 will be installed off property next to Monitoring Well 2880. This location is within an existing property easement that the DOE has with the current property owner. Uranium concentration profile data, collected at Direct Push Sampling Location 12335, indicate that the total uranium plume in this area is located at a depth within the aquifer that is deeper than the screened interval on Monitoring Well 2880 and v:\5crw2\dgn\ken_b\ken00035.dgn

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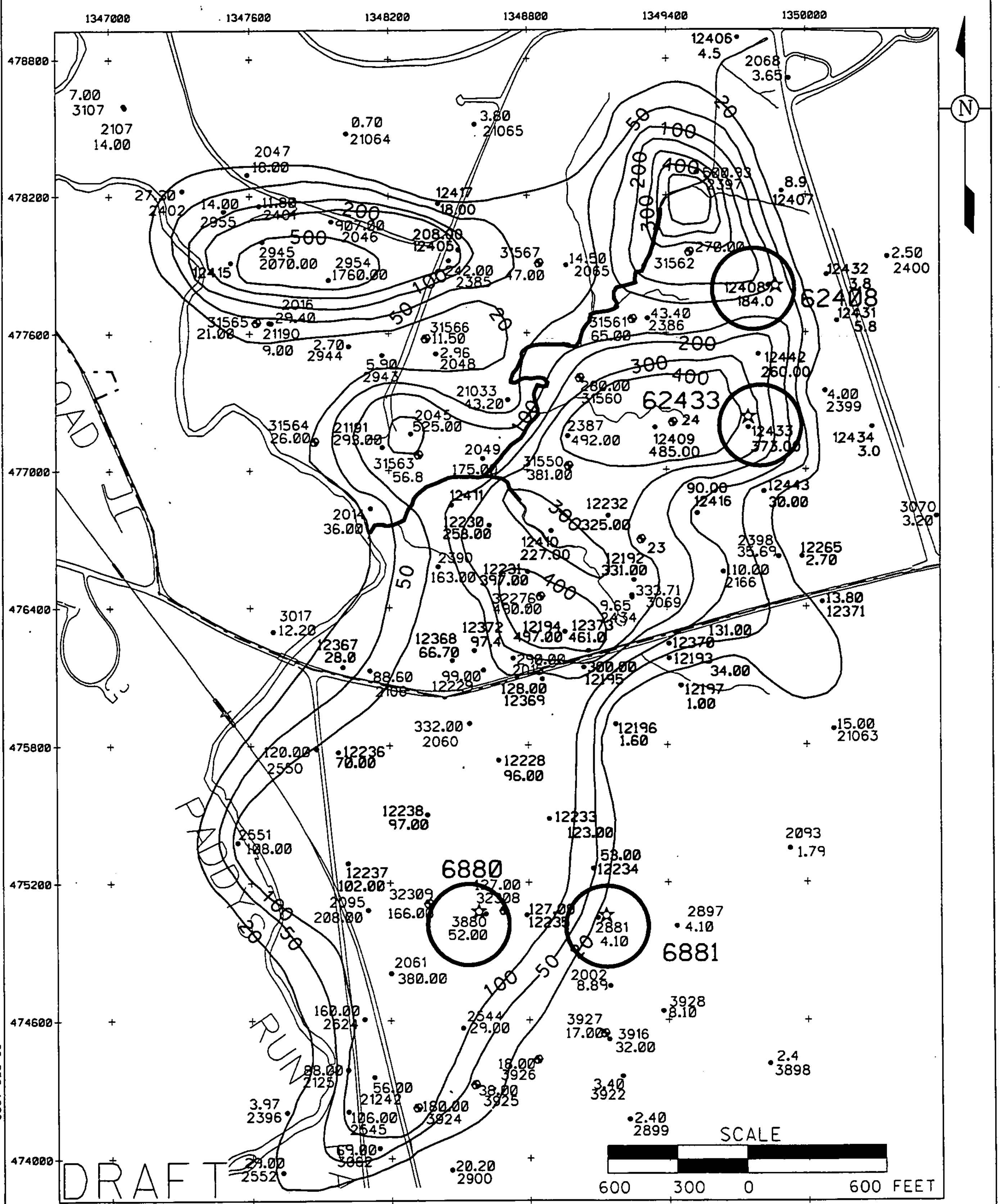

LEGEND: — · — · — FEMP BOUNDARY

• INCREASES IN 1998 THIRD OR FOURTH QUARTERS

• GEOPROBE PROJECT 52400-PSP-001

• PREVIOUS GEOPROBE LOCATION

⊗ EXTRACTION WELL

☆ PROPOSED MONITORING WELL LOCATION

000021

FIGURE 1. LOCATIONS FOR PROPOSED MONITORING WELLS

shallower than the screened interval on Monitoring Well 3880. Therefore neither Monitoring Well 2880 or 3880 can properly monitor restoration progress. The screen in Monitoring Well 6880 will be positioned within the plume. Once Monitoring Well 6880 is installed, IEMP specified sampling of Monitoring Wells 2880 and 3880 will cease. However, Monitoring Wells 2880 and 3880 will not be plugged and abandoned at this time as they may be useful for groundwater remedy certification in the future..

- Monitoring Well 6881 will be installed off property, next to Monitoring Well 2881. This location is within an existing property easement that the DOE has with the current property owner. Uranium concentration profile data, collected at Direct Push Sampling Locations 12335 and 12334, indicate that the total uranium plume in this area is located at a depth within the aquifer that is deeper than the screened interval in Monitoring Well 2881 and shallower than the screened interval in Monitoring Well 3881. Therefore neither Monitoring Well 2881 or 3881 can properly monitor restoration progress. The screen in Monitoring Well 6881 will be positioned within the plume. Once Monitoring Well 6881 is installed, IEMP specified sampling of Monitoring Wells 2881 and 3881 will cease. However, Monitoring Wells 2881 and 3881 will not be plugged and abandoned at this time as they may be useful for groundwater remedy certification in the future.

All drilling and field activities will conform to the guidelines set forth in the Sitewide CERCLA Quality Assurance Project Plan (SCQ), unless otherwise specified in this PSP. Performance of the requirements specified in standard operating procedure ADM-02, *Field Project Prerequisites*, shall precede all field activities.

ATTACHMENT 3

EVALUATION OF URANIUM LOADING VIA UNCONTROLLED SURFACE WATER RUNOFF (Formerly Attachment 1 in the November 1 Letter)

ATTACHMENT 3

EVALUATION OF URANIUM LOADING VIA UNCONTROLLED SURFACE WATER RUNOFF

The Integrated Environmental Monitoring Plan (IEMP) quarterly status reports and integrated site environmental reports include an estimate of the pounds of uranium discharged to the environment in uncontrolled runoff from the Fernald Environmental Management Project (FEMP). To date, this estimate has been calculated using a loading term of 6.25 pounds of total uranium discharged to Paddys Run for every inch of rainfall. This value was developed during the remedial investigation and is based on site conditions and analytical data collected during the late 1980s and early 1990s. Recognizing that significant changes have occurred in the FEMP landscape over the past three years as a result of active remediation, it is appropriate to re-evaluate this loading term. This attachment presents the results of the evaluation process based on current drainage basin patterns and recent analytical data collected at the primary discharge points for uncontrolled runoff into Paddys Run.

Included in this attachment is the total uranium data set used in the evaluation, the location of the pertinent drainage basins and associated changes impacting uncontrolled runoff, and the statistical analysis and calculations used to develop the updated loading term. This information is organized under the following sections:

- Data preparation and statistical analysis
- Equations and calculations
- Conclusions.

The evaluation presented in this attachment serves as the technical justification for revising/updating the loading term used for estimating the pounds of uranium discharged to the environment through uncontrolled runoff. This evaluation process will be repeated in the future as remediation progresses and site conditions affecting the quantity and/or quality of uncontrolled runoff are documented.

A.1 DATA PREPARATION AND STATISTICAL ANALYSIS

In order to provide an assessment of impacts to surface water due to uncontrolled runoff, it was necessary to identify the uncontrolled drainage basin areas associated with the FEMP. The FEMP has several drainage basins; however, only four are considered to be uncontrolled drainage basin areas which discharge to Paddys Run. Each of these four drainage area basins has an associated monitoring location (STRM 4003, STRM 4004, STRM 4005, and STRM 4006). Figure A-1 identifies the drainage basin areas associated with the FEMP and the monitoring locations associated with the uncontrolled drainage basins. The text below defines the data set that was used in order to re-evaluate the value of interest and the statistical analysis the data underwent prior to performing calculations.

A.1.1 Data Preparation

Post-remedial investigation total uranium concentrations from surface water locations STRM 4003, STRM 4004, STRM 4005, and STRM 4006 were reviewed. Table A-1 presents the total uranium results for these locations from January 1997 to March 1999 from these locations. From the table, it should be noted that the number of samples taken from each of the four locations varies, because programmatic requirements (e.g., sample frequencies) and because of sample locations being dry at times. The data in the table were then screened using the standard criteria used for IEMP data:

1) Half the non-detectable concentrations were used (results with validation qualifier of U or UJ).

2) A concentration of zero was used if the validated result was less than zero (e.g., radiological constituents can have negative concentrations when laboratory backgrounds are subtracted from results).

3) The maximum result of either the field duplicate or normal sample was used if more than one sample existed for a given location on the same day.

4) Rejected data were not used (results with validation qualifier of Z or R).

The application of Criteria 1, 2, and 4 did not result in alteration of the data set. However, the data set was slightly altered when Criterion 3 was applied.

A.1.2 Statistical Analysis

The total uranium concentration in surface water for each of the four sample locations was estimated by using the 95 percent upper confidence limit of the mean (UCL) of data collected at the respective sample locations. Using the 95 percent UCL is standard practice and provides conservative results. The initial steps in generating a meaningful UCL value include determining the nature of the underlying distribution and identifying and removing outliers. The procedures used in the statistical evaluation are outlined below.

Outlier Detection and Data Distribution Assumption

The detection of outliers in a data set often depends on the assumed nature of the underlying distribution of the data. In addition, goodness-of-fit tests for data sets to various distributions can be greatly influenced by the presence of outliers. The two concepts are interrelated and, as such, an iterative process must be followed. The method employed to determine outliers and the nature of the underlying distribution was as follows:

- A goodness-of-fit test (Shapiro-Wilk procedure) was performed on the full untransformed data set to determine the probability level of the data being from a normal distribution.

- The Shapiro-Wilk procedure was performed on the full log-transformed data set to determine the probability level of the data being from a lognormal distribution.

- Under the assumption that the data were normally distributed, Rosner's outlier procedure was performed on the untransformed data. ~~and any detected outliers (at the 5 percent significance level) were removed.~~ A Shapiro-Wilk procedure was performed on the remaining untransformed data set to determine the probability level of the data being from a normal distribution.

- Under the assumption that the data were lognormally distributed, Rosner's outlier procedure was performed on the log-transformed data. ~~and any detected outliers (at the 5 percent significance level were removed).~~ A Shapiro-Wilk procedure was performed on the remaining log-transformed data set to determine the probability level of the data being from a lognormal distribution.

The probability levels from the four procedures are compared and the procedure with the greatest probability level is determined to be the best fit to the data set. ~~If any outliers are identified by the selected procedure, then they are removed from the data set before any further calculations are performed on the data set.~~

For small sample data sets, Rosner's outlier procedure could not be used. In these cases, Dixon's procedure was used. Additionally, small sample sizes also make it difficult to determine the underlying distribution of the data set. In these cases, the normal distribution was assumed for the purposes of outlier determination and UCL calculation.

Statistical Results: Outliers and Distribution Assumptions

(Sample Locations STRM 4003, STRM 4004, and STRM 4006)

It was assumed that the data were normally distributed for the purposes of outlier identification and for further statistical evaluation. There were too few sample results to identify potential outliers using Rosner's procedure; therefore, potential outliers were identified using Dixon's procedure, which is specifically designed for small data sets that are normally distributed. For all three sample locations, Dixon's procedure failed to identify any outliers at the 5 percent significance level. Therefore, the full data sets for these three sample locations were used for subsequent statistical evaluation.

(Sample Location STRM 4005)

Sample location STRM 4005 had 31 sample results, which is an acceptable sample size for both distribution testing using the Shapiro-Wilk procedure and outlier detection using Rosner's procedure. Based on the procedure outlined above, the best fit scenario was that the data were normally distributed with one outlier detected. The potential outlier identified was the 170 micrograms per liter (μg/L) result sampled on June 2, 1997; however, this data point was left in the sample set. Therefore, 31 samples were utilized in the statistical evaluation. ~~This result is nearly double that of the second highest result of 88.5 μg/L sampled on September 23, 1998. The Rosner test statistic for the potential outlier was calculated to be 5.887. This is a significance level of less than 0.005, which represents less than a 0.5 percent chance that this data point is from the same population as the remaining 30 samples. For subsequent statistical calculations, this data point was considered to be an outlier and removed from the data set.~~

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ATTACHMENT 3
(Continued)

A.2 EQUATIONS AND CALCULATIONS

A.2.1 Equations

Equation 1 was used to determine the pounds of uranium per inch of rainfall estimated to be present in uncontrolled runoff from the FEMP. This equation was used in the past to determine the previous value of 6.25 pounds of uranium per inch of rainfall. The equation was used for each drainage basin area (identified on Figure A-1) and then the pounds of uranium per inch of rainfall (associated with each drainage basin) were summed in order to achieve a current representative number for the FEMP.

Equation 1: $P = V * UC * 0.008337$

where:

P =	Pounds of uranium for each inch of rainfall (per drainage basin) (lbs/inch of rainfall)
V =	Volume of runoff per inch of rainfall (per drainage basin) (Mgal/inch of rainfall)
UC =	95 percent UCL for total uranium concentrations (per drainage basin) (μg/L)
0.008337 =	Conversion factor used to convert to pounds per inch of rainfall ((L*lbs)/(Mgal*μg))

The 95 percent UCL for total uranium concentrations was determined through the statistical evaluation identified in Section A.2. The specific concentrations for the drainage basins are provided in Table A-2.

The volume of runoff per inch of rainfall (V) in the above equation must be calculated for each drainage basin and is done so by the following equation:

Equation 2: $V = C * T * 0.027$

where:

V=	Volume of runoff per inch of rainfall (per drainage basin) (Mgal/inch of rainfall)
C=	Runoff coefficient (unitless)

T = Total drainage basin area (acres)

0.027 = Conversion factor used to convert to Mgal per inch of rainfall (Mgal/(acre*inch)

The runoff coefficient identified above must also be calculated for each drainage basin and is done so by the below equation. This standard equation is from the EPA Office of Water Enforcement and Permits Guidance Manual/EPA Stormwater Guidance Manual (EPA 1991).

Equation 3: $C = (0.5 * TP/T) + (0.9 * TI/T)$

where:

C = Runoff coefficient (unitless)

TP = Total pervious drainage basin area (acres)

T = Total drainage basin area (acres)

TI = Total impervious drainage basin area (acres)

The acres associated with the drainage basins (total, pervious, and impervious) are presented in Table A-2. Total drainage basin area acreage does not include any acreage where surface water is controlled (refer to Figure A-1). Therefore, because the amount of controlled areas has increased (e.g., areas in the vicinity of the on-site disposal cell and the southern waste units) since the remedial investigation, the total acreage associated with the drainage basins has been reduced. Pervious drainage basin area refers to those areas with natural surfaces (e.g., grass and soils) and impervious drainage basin area refers to those areas with manmade surfaces (e.g., paved roads, gravel roads, and structures with roofs).

A.2.2 <u>Calculations</u>

The equations provided in Section A.3.1 along with Table A-2 were used to perform the calculations. Below are some sample equations and Table A-3 provides the results from all the equations.

Equation 3: $C = (0.5 * TP/T) + (0.9 * TI/T)$

for STRM 4003:

$$C = (0.5 * (483.3/517.7)) + (0.9 * (34.4/517.7))$$

$$C = 0.5266$$

Equation 2: V = C * T * 0.027

for STRM 4003:

V = 0.5266 * 517.7 * 0.027

V = 7.361 Mgal/inch

Equation 1: P = V * UC * 0.008337

for STRM 4003:

P = 7.361 * 13.5 * 0.008337
P = 0.828 lbs/inch

Summing the pounds of uranium for each inch of rainfall (P) for each drainage basin area identified in Table A-3 would yield the value of ~~2.53~~ 2.6 pounds of uranium for each inch of rainfall.

A.3 CONCLUSIONS

The loading value of ~~2.53~~ 2.6 pounds of uranium per inch of rainfall will be used in future calculations when estimating the pounds of uranium entering the environment through uncontrolled runoff. As expected, the revised estimate for the amount of uranium released through uncontrolled runoff is significantly less (~~2.53~~ 2.6 versus 6.25 pounds per inch of rainfall) as a result of the removal of contaminant sources and the additional measures that have been taken to control contaminated runoff over the last several years. In an effort to maintain an accurate loading term, this evaluation process will be repeated in the future as remediation progresses and site conditions affecting the quantity and/or quality of uncontrolled runoff are observed.

ATTACHMENT 3
(Continued)

TABLE A-1

TOTAL URANIUM RESULTS FOR SURFACE WATER LOCATIONS 4003, 4004, 4005, AND 4006

Surface Water Monitoring Locations	Constituent	Date Sampled[a]	Validated Result[a]	Validation Qualifier	Units	Type[b]
STRM 4003	Uranium, Total	6/2/97	3	NV	μg/L	N
STRM 4003	Uranium, Total	6/16/97	2.6	NV	μg/L	N
STRM 4003	Uranium, Total	6/16/97	5.74	NV	μg/L	N
STRM 4003	Uranium, Total	12/4/97	17.8	NV	μg/L	N
STRM 4003	Uranium, Total	6/10/98	4.2	NV	μg/L	N
STRM 4003	Uranium, Total	12/22/98	8.6	NV	μg/L	N
STRM 4004	Uranium, Total	6/2/97	80.5	NV	μg/L	N
STRM 4004	Uranium, Total	8/20/97	22.8	NV	μg/L	D
STRM 4004	Uranium, Total	8/20/97	26.5	NV	μg/L	N
STRM 4004	Uranium, Total	6/11/98	4.1	NV	μg/L	N
STRM 4004	Uranium, Total	12/22/98	7.2	NV	μg/L	N
STRM 4005	Uranium, Total	1/1/97	75	NV	μg/L	N
STRM 4005	Uranium, Total	1/8/97	67	NV	μg/L	N
STRM 4005	Uranium, Total	1/22/97	53	NV	μg/L	N
STRM 4005	Uranium, Total	2/5/97	64	NV	μg/L	N
STRM 4005	Uranium, Total	2/12/97	81	NV	μg/L	N
STRM 4005	Uranium, Total	2/19/97	81	NV	μg/L	N
STRM 4005	Uranium, Total	2/26/97	69	NV	μg/L	N
STRM 4005	Uranium, Total	4/9/97	59	NV	μg/L	N
STRM 4005	Uranium, Total	4/16/97	66	NV	μg/L	N
STRM 4005	Uranium, Total	6/2/97	170[c]	NV	μg/L	N
STRM 4005	Uranium, Total	7/22/97	52	NV	μg/L	N
STRM 4005	Uranium, Total	7/22/97	52	NV	μg/L	N
STRM 4005	Uranium, Total	8/22/97	86	NV	μg/L	D
STRM 4005	Uranium, Total	8/22/97	88	NV	μg/L	N
STRM 4005	Uranium, Total	9/11/97	65	NV	μg/L	N
STRM 4005	Uranium, Total	10/27/97	52	NV	μg/L	N
STRM 4005	Uranium, Total	11/21/97	58	NV	μg/L	N
STRM 4005	Uranium, Total	12/4/97	70.8	NV	μg/L	N
STRM 4005	Uranium, Total	12/12/97	82.396	J	μg/L	N
STRM 4005	Uranium, Total	1/9/98	83	NV	μg/L	N
STRM 4005	Uranium, Total	2/12/98	77.3	NV	μg/L	N
STRM 4005	Uranium, Total	3/17/98	21	NV	μg/L	N
STRM 4005	Uranium, Total	4/1/98	61.4	NV	μg/L	N
STRM 4005	Uranium, Total	6/10/98	32.8	NV	μg/L	N
STRM 4005	Uranium, Total	6/17/98	77	NV	μg/L	N
STRM 4005	Uranium, Total	7/23/98	54.6	NV	μg/L	N
STRM 4005	Uranium, Total	8/26/98	19.9	-	μg/L	N
STRM 4005	Uranium, Total	9/23/98	88.5	NV	μg/L	N
STRM 4005	Uranium, Total	10/21/98	47.005	J	μg/L	N
STRM 4005	Uranium, Total	11/13/98	49.4	NV	μg/L	N

ATTACHMENT 3
(Continued)

TABLE A-1
(Continued)

Surface Water Monitoring Locations	Constituent	Date Sampled[a]	Validated Result[a]	Validation Qualifier	Units	Type[b]
STRM 4005	Uranium, Total	12/15/98	35.7	NV	μg/L	N
STRM 4005	Uranium, Total	12/18/98	34.7	NV	μg/L	N
STRM 4005	Uranium, Total	3/17/99	47.4	NV	μg/L	N
STRM 4006	Uranium, Total	5/24/97	15.7	NV	μg/L	N
STRM 4006	Uranium, Total	5/24/97	15.7	NV	μg/L	N
STRM 4006	Uranium, Total	6/2/97	47.3	NV	μg/L	N
STRM 4006	Uranium, Total	12/4/97	1	NV	μg/L	N
STRM 4006	Uranium, Total	6/10/98	2.1	NV	μg/L	N
STRM 4006	Uranium, Total	12/17/98	52.5	NV	μg/L	N
STRM 4006	Uranium, Total	3/16/99	27	NV	μg/L	N

[a]If more than one sample is collected for a given location on the same day, then the sample with the maximum concentration is used for statistical analysis.
[b]If more than one sample per day is identified as N (normal), then composite and grab samples were collected. The highest concentration for the day was used for statistical analysis.
[c]~~Identified as an outlier in statistical analysis.~~

ATTACHMENT 3
(Continued)

TABLE A-2

TOTAL URANIUM AND DRAINAGE BASIN ACREAGE (TOTAL, IMPERVIOUS AND PERVIOUS) DATA USED TO PERFORM POUNDS OF URANIUM PER INCH OF RAINFALL CALCULATIONS

Associated Surface Water Locations	95 Percent UCL for Total Uranium Concentrations (UC) (μg/L)	Total Drainage Basin Area (T) (acres)	Total Impervious Drainage Basin Area (TI) (acres)	Total Pervious Drainage Basin Area (TP) (acres)
STRM 4003	13.5	517.7	34.4	483.3
STRM 4004	71.19	17.0	0.7	16.3
STRM 4005	72.22 ~~66.30~~	66.0	6.4	59.6
STRM 4006	42.4	210.5	6.9	203.6

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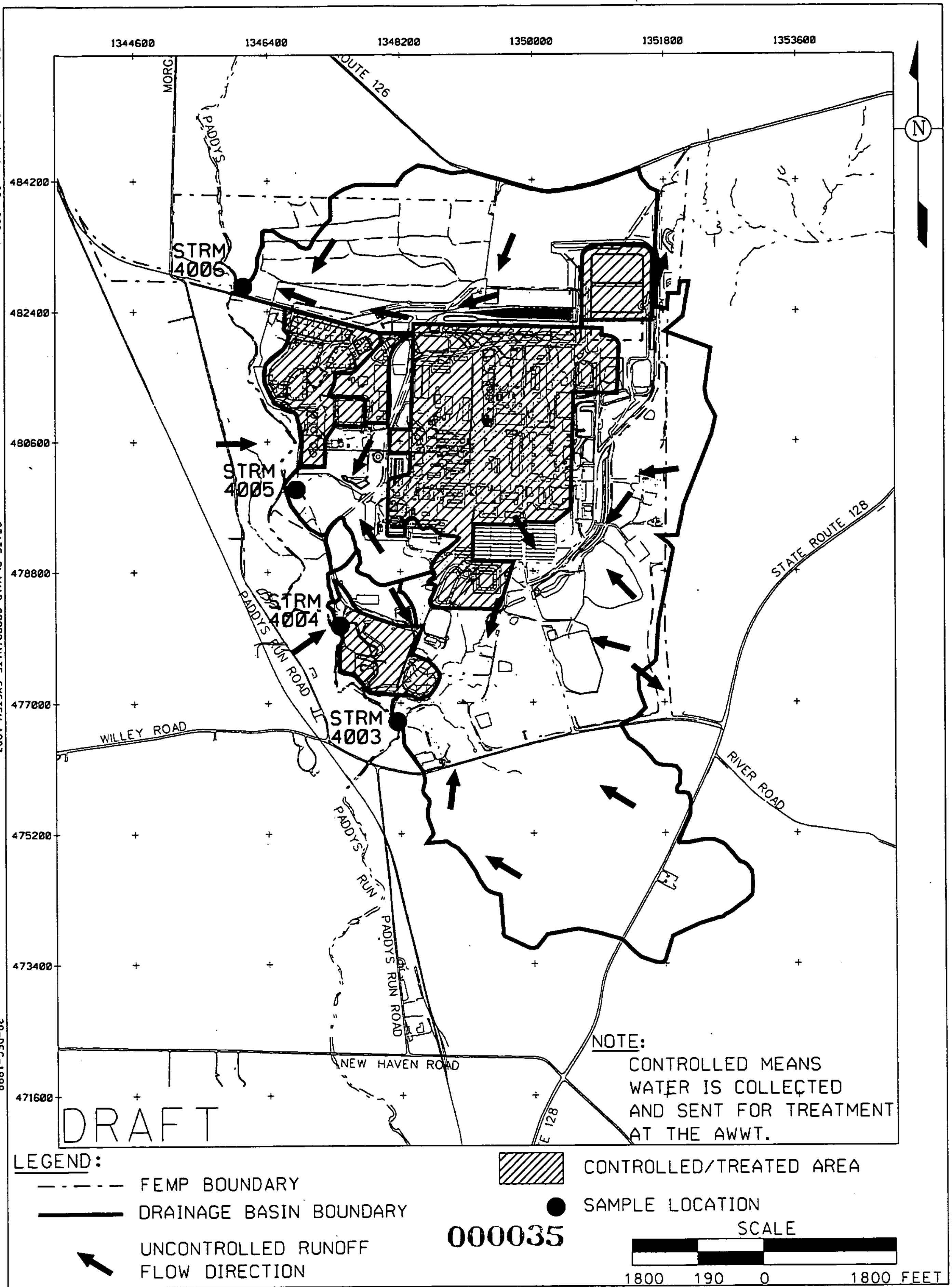
ATTACHMENT 3
(Continued)

TABLE A-3

CALCULATED VARIABLES ASSOCIATED WITH EACH DRAINAGE BASIN SURFACE WATER LOCATION

Associated Surface Water Locations	Runoff Coefficient (C) (unitless)	Volume of Runoff per Inch of Rainfall (V) (Mgal/in)	Pounds of Uranium for Each Inch of Rainfall (P) (lbs/in)
STRM 4003	0.5266	7.361	0.828
STRM 4004	0.52	0.24	0.14
STRM 4005	0.539	0.960	0.578 ~~0.531~~
STRM 4006	0.514	2.92	1.03
			Total 2.576[a]

[a]The value of 2.6 will be used as the loading term to calculate the pounds of uranium discharged to the environment from uncontrolled runoff.



v:*5fgp1*dgn*99revision*99rv002.dgn

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FIGURE A-1. DRAINAGE BASIN AREAS AND ASSOCIATED SURFACE WATER MONITORING LOCATIONS

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ATTACHMENT 4

(Formerly Table A-1 of Attachment 1 in the November 1 letter)
(Comment Response #9)

ATTACHMENT 4

TABLE B-1

TOTAL URANIUM RESULTS FOR SURFACE WATER LOCATIONS 4003, 4004, 4005, AND 4006

Surface Water Monitoring Locations	Constituent	Date Sampled[a]	Validated Result[a]	Validation Qualifier	Units	Type[b]
STRM 4003	Uranium, Total	6/2/97	3	NV	μg/L	N
STRM 4003	Uranium, Total	6/16/97	2.6	NV	μg/L	N
STRM 4003	Uranium, Total	6/16/97	5.74	NV	μg/L	N
STRM 4003	Uranium, Total	12/4/97	17.8	NV	μg/L	N
STRM 4003	Uranium, Total	6/10/98	4.2	NV	μg/L	N
STRM 4003	Uranium, Total	12/22/98	8.6	NV	μg/L	N
STRM 4004	Uranium, Total	6/2/97	80.5	NV	μg/L	N
STRM 4004	Uranium, Total	8/20/97	22.8	NV	μg/L	D
STRM 4004	Uranium, Total	8/20/97	26.5	NV	μg/L	N
STRM 4004	Uranium, Total	6/11/98	4.1	NV	μg/L	N
STRM 4004	Uranium, Total	12/22/98	7.2	NV	μg/L	N
STRM 4005	Uranium, Total	1/1/97	75	NV	μg/L	N
STRM 4005	Uranium, Total	1/8/97	67	NV	μg/L	N
STRM 4005	Uranium, Total	1/22/97	53	NV	μg/L	N
STRM 4005	Uranium, Total	2/5/97	64	NV	μg/L	N
STRM 4005	Uranium, Total	2/12/97	81	NV	μg/L	N
STRM 4005	Uranium, Total	2/19/97	81	NV	μg/L	N
STRM 4005	Uranium, Total	2/26/97	69	NV	μg/L	N
STRM 4005	Uranium, Total	4/9/97	59	NV	μg/L	N
STRM 4005	Uranium, Total	4/16/97	66	NV	μg/L	N
STRM 4005	Uranium, Total	6/2/97	170[c]	NV	μg/L	N
STRM 4005	Uranium, Total	7/22/97	52	NV	μg/L	N
STRM 4005	Uranium, Total	7/22/97	52	NV	μg/L	N
STRM 4005	Uranium, Total	8/22/97	86	NV	μg/L	D
STRM 4005	Uranium, Total	8/22/97	88	NV	μg/L	N
STRM 4005	Uranium, Total	9/11/97	65	NV	μg/L	N
STRM 4005	Uranium, Total	10/27/97	52	NV	μg/L	N
STRM 4005	Uranium, Total	11/21/97	58	NV	μg/L	N
STRM 4005	Uranium, Total	12/4/97	70.8	NV	μg/L	N
STRM 4005	Uranium, Total	12/12/97	82.396	J	μg/L	N
STRM 4005	Uranium, Total	1/9/98	83	NV	μg/L	N
STRM 4005	Uranium, Total	2/12/98	77.3	NV	μg/L	N
STRM 4005	Uranium, Total	3/17/98	21	NV	μg/L	N
STRM 4005	Uranium, Total	4/1/98	61.4	NV	μg/L	N
STRM 4005	Uranium, Total	6/10/98	32.8	NV	μg/L	N
STRM 4005	Uranium, Total	6/17/98	77	NV	μg/L	N
STRM 4005	Uranium, Total	7/23/98	54.6	NV	μg/L	N
STRM 4005	Uranium, Total	8/26/98	19.9	-	μg/L	N
STRM 4005	Uranium, Total	9/23/98	88.5	NV	μg/L	N
STRM 4005	Uranium, Total	10/21/98	47.005	J	μg/L	N
STRM 4005	Uranium, Total	11/13/98	49.4	NV	μg/L	N
STRM 4005	Uranium, Total	12/15/98	35.7	NV	μg/L	N

ATTACHMENT 4
(Continued)

TABLE B-1
(Continued)

Surface Water Monitoring Locations	Constituent	Date Sampled[a]	Validated Result[a]	Validation Qualifier	Units	Type[b]
STRM 4005	Uranium, Total	12/18/98	34.7	NV	µg/L	N
STRM 4005	Uranium, Total	3/17/99	47.4	NV	µg/L	N
STRM 4006	Uranium, Total	5/24/97	15.7	NV	µg/L	N
STRM 4006	Uranium, Total	5/24/97	15.7	NV	µg/L	N
STRM 4006	Uranium, Total	6/2/97	47.3	NV	µg/L	N
STRM 4006	Uranium, Total	12/4/97	1	NV	µg/L	N
STRM 4006	Uranium, Total	6/10/98	2.1	NV	µg/L	N
STRM 4006	Uranium, Total	12/17/98	52.5	NV	µg/L	N
STRM 4006	Uranium, Total	3/16/99	27	NV	µg/L	N

Note: Highlighting indicates data that has not been transmitted on a data disk to the agencies.

[a]If more than one sample is collected for a given location on the same day, then the sample with the maximum concentration is used for statistical analysis.
[b]If more than one sample per day is identified as N (normal), then composite and grab samples were collected. The highest concentration for the day was used for statistical analysis.
[c]Identified as an outlier in statistical analysis