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Department of Energy

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DEC 6 2005

DOE-0038-06

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

Mr. Thomas Schneider, Project Manager
Ohio Environmental Protection Agency
Southwest District Office
401 East Fifth Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL OF RESPONSES TO U.S. AND OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE WASTE STORAGE AREA PHASE II DESIGN REPORT, REVISION A, AND AN ADDENDUM TO THE WASTE STORAGE AREA PHASE II DESIGN REPORT, REVISION A

References:
1) Letter, William J. Taylor to James A. Saric and Thomas Schneider, "Transmittal of the Waste Storage Area Phase II Design Report, Revision A," Draft Final, dated July 12, 2005

2) Letter, James A. Saric to Johnny Reising, "Waste Storage Area Phase II Design Report," dated August 16, 2005

3) Letter, Thomas Schneider to William Taylor, "Comments on Waste Storage Area Phase II Design," dated August 17, 2005

This letter transmits responses to the United States Environmental Protection Agency (EPA) Comments (Reference 2) and Ohio Environmental Protection Agency (OEPA) Comments (Reference 3) on the Waste Storage Area Phase II Design Report and an Addendum to the Waste Storage Area Phase II Design Report (Reference 1).

If you have any questions or require additional information, please contact me at (513) 648-3139.

Sincerely,

Johnny W. Reising
Director

Enclosure

cc w/enclosure:
Dave Lojek, DOE-OH
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RESPONSES TO U.S. AND OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE WASTE STORAGE (PHASE II) DESIGN REPORT REVISION A

FERNALD CLOSURE PROJECT
FERNALD, OHIO

DECEMBER 2005

U.S. DEPARTMENT OF ENERGY

U.S. ENVIRONMENTAL PROTECTION AGENCY TECHNICAL REVIEW COMMENTS ON THE WASTE STORAGE AREA (PHASE II) DESIGN REPORT, REVISION A

GENERAL COMMENTS

1. Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.0 Pg #: Not Applicable (NA) Line #: NA
General Comment #: 1

Comment: The characterization conclusions for contaminants not modeled daily indicate locations where the groundwater final remediation level (FRL) was exceeded and if each location is within the uranium plume being targeted. The report should include a discussion about respective Kd values for each contaminant and how they compare to uranium remediation predictions.

Response: Partition coefficients were compiled for manganese, molybdenum, nickel, nitrate, carbon disulfide and trichloroethylene, and are provided below. The references used to compile the partition coefficients are also provided below. The partition coefficient values reflect aqueous conditions similar to those in the Great Miami Aquifer (GMA) (i.e., carbonate groundwater at near neutral pH), with the exception of carbon disulfide and trichloroethylene. Adsorption of organic constituents is primarily a function of the fraction of organic carbon in the sediment.

Excluding nickel, the Kd values shown below are all less than the Kd value of 3.0 L/kg used for uranium. This indicates that the contaminants will be captured during the remediation of the uranium plume. For nickel, Kd values are much greater than uranium, and persistent contamination is possible as nickel slowly desorbs from the sediment. However, nickel contamination is limited to a single location and it may not persist at Well 2649, because it is located within 500 feet of active recharge along Paddys Run. Nickel will be monitored at Well 2649 during remediation of the uranium plume, and further action may be warranted if the nickel contamination persists above it's final remediation level (FRL).

Compiled Partition Coefficient Values

Specie	K_d (L/kg)	Carbonate System	reference
Mn^{2+}	0.4 to 1.3	Yes	Bryan, et al. 2004
MoO_4^{2-}	0.2 to 1.0	No, but pH = 7	Goldberg, et al. 2002
Ni^{2+}	48 to 368	Yes	Cantrell, et al. 2003
NO_3^-	0.65 to 1.1	Yes	Mikolajkow 2003
Carbon disulfide	0.46 to 0.54	NA*	ADEC 2004 NYSDEC 2005
Trichloroethylene	0.87 to 1.5	NA*	U.S. EPA 2005

*Not applicable, as sorption of organic compounds is dependent on organic carbon in the sediment. K_d calculated ($K_d = K_{oc}*f_{oc}$) from reported water/organic-carbon partition coefficient (K_{oc}), assuming fraction of organic carbon (f_{oc}) is 0.01 in the GMA.

References

Alaska Department of Environmental Conservation (ADEC), 2004, Division of Spill Prevention and Response, Contaminated Sites Remediation Program, Cleanup Levels Guidance.

Bryan, C.R., Spilde, M., Huifang, X., Schloesslin, C. and Davis, K.D., 2004, "Results of Uranium Adsorption/Desorption Experiments and Microanalytical Studies Characterizing Sediment Samples from the Great Miami Aquifer, Fernald DOE Site, Ohio," SAND2004-4085, Sandia National Laboratories.

Cantrell, K.J., Serne, R.J. and G.V. Last, 2003, "Hanford Contaminant Distribution Coefficient Database and Users Guide," PNNL-13895, Pacific Northwest National Laboratory.

Goldberg, S., S.M. Lesch, and D.L. Suarez, 2002, "Predicting Molybdenum Adsorption by Soils Using Soil Chemical Parameters in the Constant Capacitance Model," *Soil Science Society of America Journal,* v. 66, pp. 1836–1842.

Mikolajkow, J., 2003, "Laboratory Methods of Estimating the Retardation Factor of Migrating Mineral Nitrogen Compounds in Shallow Groundwater," *Geological Quarterly,* v. 47, pp. 91–96.

New York State Department of Environmental Conservation (NMSDEC), 2005, "VOCs Soil Cleanup Criteria Table," www.dec.state.ny.us/website/der/tagms/prtg4046b.html

United States Environmental Protection Agency (U.S. EPA), 2005, "Technical Fact Sheet on Trichloroethylene," www.epa.gov/OGWDW/dwh/t-voc/trichlor.html

Action: Information presented in the response above has been incorporated into the attached Addendum to the Waste Storage Area (Phase II) Design Report.

SPECIFIC COMMENTS

2. Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.0 Pg #: 3-1 Line #: NA
Original Specific Comment #: 1
Comment: The text states that modeling began with the assumption that one additional extraction well would be needed. The report should be revised to clearly state the pumping rate used in the model and how this rate was determined.
Response: Target pumping rates for extraction wells in the Waste Storage Area (Phase II) Design Report are provided in Table 3-1. The target pumping rates range from 100 gallons per minute (gpm) to 500 gpm. The additional extraction well modeled in the WSA is identified in Table 3-1 as WSA-5. It has a target-pumping rate of 300 gpm. This pumping rate was selected because it provided a clean-up end date consistent with the WSA Phase I Module, as shown in Figure 3-18 of the WSA Phase II Design Report.
Action: Information presented in the above response has been incorporated into the attached Addendum to the Waste Storage Area (Phase II) Design Report.

3. Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.1 Pg #: 3-1 Line #: NA
Original Specific Comment #: 2
Comment: The text states that October 1998 head boundary conditions were used for groundwater modeling. The report should be revised to state what these conditions are and how they

compare to current conditions. The referenced report, "Design for Remediation of the Great Miami Aquifer, South Field (Phase II) Module" only indicates that these conditions were generated using the large VAM3D model and does not provide actual head boundaries.

Response: These boundary conditions were discussed in detail in the Great Miami Aquifer VAM3D Flow Model Re-Calibration Report (DOE 2000). The actual target heads are listed in Appendix A of the subject report. Appendix D of the same report also discusses and presents the dry and wet boundary condition data sets corresponding to July 1998 (wet) and October 1999 (dry). For a comparison, refer to Figure 3-1 (calibration target) of the subject report to compare against the heads simulated in this report.

Action: No change to the report is required.

4. Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.2 Pg #: 3-3 Line #: NA
Original Specific Comment #: 3

Comment: The text states that a constant Kd value of 3.0 liters per kilogram (1/kg) was used for total uranium. Although this value may be consistent with previous groundwater modeling, the most conservative and reasonable Kd estimate should be used to provide a worst case scenario for remedial evaluation.

Response: A Kd of 3.0 liters per kilogram (l/kg) is consistent with the most recent lab results and is considered to be the most conservative and reasonable Kd value to use. A discussion concerning the selection of this Kd value is in the Comprehensive Groundwater Strategy Report, Attachment A.1 (DOE 2003).

Action: No change to the report is required.

OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE WASTE STORAGE AREA (PHASE II) DESIGN REPORT, REVISION A

ORIGINAL COMMENTS

5. Commenting Organization: Ohio EPA Commentor: DD&GW
Section #: Pg #: Line #: Code: G
Original Comment #: 1
Comment: There is no evidence that model runs were ever done for extraction system optimization. Take a look at multiple extraction points, depths and rates in order to best design the system. It is important that the system be designed effectively and efficiently in order to a) minimize migration of the plume and b) minimize "smearing" of contaminants as the water table rises and falls.
Response: Additional model runs to optimize the Waste Storage Area (WSA) (Phase II) design are not considered necessary. An objective of the aquifer remedy is to leave the most cost effective infrastructure in place following site closure next year. Modeling for Phase II, began with one additional well. Because predicted cleanup times from the initial modeling run were judged as being acceptable, additional modeling was not conducted.

The design of this well is based on collective experience gained from designing over 30 extraction wells for the aquifer remedy. The target depth for the new extraction well is based on the thickness of the plume mapped in the area. Placement of the new well will minimize migration of the plume because the plume will not need to be pulled to the Phase I Extraction Wells to be remediated.
Action: No change to the report is required.

6. Commenting Organization: Ohio EPA Commentor: DD&GW
Section #: Pg #: Line #: Code: G
Original Comment #: 2
Comment: The text states that the Department of Energy did not look at re-injection as part of this investigation, however, they didn't justify this action. The total uranium concentrations here are high, and we know through experience that the smearing of contaminants between the vadose zone and the aquifer proper dramatically influence cleanup times. This is best illustrated in Figure 2-3 of the plan. The highest concentrations are found at the water table surface. If the water table allowed to fluctuate, the largest amount of contaminant mass will be able to move with it. By doing so, contamination will get tied up into the vadose zone, where ground water does not routinely move in saturated conditions. Re-injection could maintain saturated flow in this zone, thereby removing more contaminants in less time; just like every other place at this site.

Our use of the term "re-injection" should be interpreted in this context to include the use of infiltration ponds, ditches, etc.
Response: The former Cement Pond and Clear Well areas are being targeted as infiltration points to the aquifer. These areas are ideally located for such an operation because they are situated on the northwest edge of the uranium plume that is being targeted for remediation. Infiltration of clean water in these areas should help flush contamination from the aquifer and accelerate cleanup of the plume. The current restoration design for the Waste Storage Area is contained in the Waste Pits and Paddy's Run Natural Resource Restoration Design Plan (transmitted to EPA and OEPA on 11/28/2005). Through a series of basin overflows, culverts, and ditches, the Restoration Design directs surface water runoff from the former Waste Storage Area and Paddy's Run (when there is high flow in the stream) into these areas.

Action: No change to the report is required. With EPA concurrence, DOE will restore the Waste Storage Area such that surface water will be directed to the former Cement Pond and Clear Well Areas for the purpose of inducing infiltration to the Great Miami Aquifer.

7. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: Pg #: Line #: Code: G
Original Comment #: 3
Comment: The Plan pretty much writes off remediation the manganese plume.
The text should be revised to include a thorough geochemical justification for not aggressively pursuing the manganese plume. Speciation software should be used to determine the most likely chemical form(s) for manganese. The geochemical redox conditions in the GMA should be determined and the long-term stability of aquifer geochemistry should be assessed taking into consideration both the remedial pumping and the effects of enhanced infiltration.

Lacking convincing arguments that the manganese species are stabile and immobile, the Plan should be re-written to address the remediation of the manganese plume.

Response: An addendum to the plan has been prepared to address the remediation of the manganese plume. The geochemical code EQ3NR was used to calculate the Mn speciation in GMA water (Direct Push Location 13342, Mn = 1.1 milligrams per liter [mg/L], September 2005). Results are as follows: Mn^{2+} 84.6%, $MnCO_3(aq)$ 9.65%, $MnSO_4(aq)$ 3.07%, and $MnHCO_3^+$ 2.64%. The Mn (II) ion is very mobile in carbonate groundwater, because Ca^{2+} ions compete for sorption sites on the sediment (Merdy, et al. 2002). Moreover, Mn will not be removed from the aquifer by precipitation of MnO_2, due to oxidation of Mn (II) to Mn (IV). Based on the observed concentrations for Mn (II) in the GMA, redox conditions in the GMA are below 500 millivolts (mV) at the near-neutral pH. As MnO_2 has a very low solubility product, the observed concentrations for Mn (II) would not be possible if redox conditions were above 500 mV. The long-term stability of the carbonate geochemical system is ensured by the large percentage of carbonate minerals (calcite + dolomite > 50%) in the aquifer sediments.

Sorption studies by Sandia National Laboratory (SNL) (Bryan, et al. 2004), using GMA sediment and groundwater, confirm the mobility of Mn^{2+} in the aquifer (Mn Kd values range from 0.4 to 1.3 liters per kilogram [L/kg]). Although the SNL sorption studies focused on uranium and did not report results for Mn, Mn Kd values can be extracted from the data because major and minor cations were tracked along with the uranium concentrations.

The SNL sorption studies, along with the above geochemical analysis and revised plume geometry, indicate that the Mn plume will be captured during the remediation of the uranium plume. Groundwater modeling presented in the Addendum to the WSA (Phase II) Design Report (attached to these comment responses) predicts that the manganese plume will be remediated by 2007 with the current WSA Phase II extraction well.

Action: Information presented in the above response has been incorporated into the attached Addendum to the Waste Storage Area (Phase II) Design Report. The attached addendum addresses remediation of the manganese plume.

8. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: Pg #: Line #: NA Code: G
Original Comment #: 4
Comment: The report begins with the conclusion that only one extraction well is needed in the WSA and attempts to make the data fit that conclusion, particularly with respect to manganese. It seems to prematurely suggest technical impractability for pump and treat remediation

of the manganese plume, even though no site-specific data regarding manganese mobility or lack thereof in the GMA is provided. Clearly, additional work is needed, both with respect to characterization of the extent manganese contamination and to feasibility assessment of various remedial options to address it.

Response: Additional work to characterize the manganese plume and to address remediation of the manganese plume was conducted and is reported in the Addendum to the Waste Storage Area (Phase II) Design Report.

Action: Additional work to characterize the manganese plume and to address remediation of the manganese plume is provided in the attached Addendum to the Waste Storage Area (Phase II) Design Report.

9. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 2 Pg.#: 2-1 Line #: NA Code: C
Original Comment #: 5
Comment: Did the Geoprobe borings (13328, 13324, 13327, 13325, and 12617B) in the vicinity of Monitoring Well 2549 contact the top of the blue clay?
Response: No, probing did not contact the top of the blue clay. The expected elevation of the top of the blue clay is known from earlier drilling in the area, and was considered when the depth of the new probes was being planned.
Action: No change to the report is required.

10. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 2 Pg.#: Figure 2-1 Line #: NA Code: C
Original Comment #: 6
Comment: Wells 2027 and 3027 could not be located.
Response: These two wells have been added to the figure.
Action: A revised figure is provided in the attached Addendum to the Waste Storage Area (Phase II) Design Report.

11. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 2.1 Pg #: 2-2 Line #: last sentence of 2nd paragraph Code: C
Original Comment #: 7
Comment: The text states that uranium results of direct push samples in the area of the Clearwell (13324 and 13328) are much higher than monitor well (2649) results would lead one to predict. The monitor well was installed sometime in the past and the direct-push samples were obtained more recently than the past year.

These observations and the shallow contamination at direct-push Location 13328 argue that the uranium plume in this area is of recent origin.

Response: Although Monitoring Well 2649 was installed in the past, it is still routinely sampled. As shown in Figure 2-2, in the first half of 2005 the uranium concentration at Well 2649 was 87.1 micrograms per liter (µg/L). Monitoring Well 2649 is located right next to the Clearwell. If the uranium plume was of recent origin and the Clearwell was the source, the highest uranium contamination would be expected at this monitoring location. The highest uranium contamination though is detected south and southeast of the Clearwell.

A recent source for the area where the highest uranium concentrations were detected is not known, but a possible source for the plume was available in the past via an old drainage ditch. Flow in the ditch was disrupted sometime ago, leading to the conclusion that the plume is probably several years old.

The area around Monitoring Well 2649 was targeted for remediation prior to the collection of the most recent direct-push samples. In the past, the concentration of uranium measured at Monitoring Well 2649 was as high as 125 µg/L (January 19, 2004).

On January 10, 2005 the concentration measured was 87.1 μg/L. These concentrations are considerably lower than the maximum uranium concentrations measured in early 2005 at direct-push Locations 13328 and 13324 of 2060 μg/L and 1083 μg/L, respectively. Monitoring Well 2649 is located right next to the Clearwell. Direct-push Locations 13328 and 13324 are located south and southeast of the Clearwell. The larger uranium concentration south and southeast of the Clearwell indicates that although leakage from the Clearwell could have contributed to the uranium plume, it doesn't appear that the Clearwell is the entire source. As explained in the design report, an old drainage ditch previously ran from the Plant 1 Pad area to the WSA. It is possible that contamination could have been carried in this ditch to the area around direct-push Location 13328, where it infiltrated into the aquifer.

Action: No change to the report is required.

12. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 2.1 Pg #: 2-2 Line #: last paragraph on page Code: C
Original Comment #: 8

Comment: The paragraph describes two possible source term scenarios for the uranium plume. Possible source number one is the old drainage ditch from the Plant 1 Pad. Source number 2 is leakage from the clearwell.

Contaminated flows from the Plant 1 Pad should have been nearly completely stopped when storm water management was initiated sometime around 1986. The Clearwell was a potential source from the date of construction until it was remediated less than a year ago.

An assessment should be performed to decide which of the sources are most likely. If it is determined that the Clearwell was, in fact, the source a study should be undertaken to explore the feasibility of locating an infiltration pond over the former location of the Clearwell.

Response: The former Cement Pond and Clear Well areas are being targeted as infiltration points to the aquifer. Please see response to Ohio EPA Original Comment #2

Action: Please see action to Ohio EPA Original Comment #2.

13. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 2.1 Pg #: 2-3 Line #: last 2 sentences in section Code: C
Original Comment #: 9

Comment: The text reads, "Had water levels been higher when Direct Push Locations 13328 and 13324 were sampled, measured uranium concentration might also have been higher. Residual uranium contamination in the vadose zone could hinder future aquifer certification efforts."

These statements further support the need for some type of re-injection: both to maintain the water table elevation and to flush the vadose zone.

Response: Agreed. The former Cement Pond and Clear Well areas are being targeted as infiltration points to the aquifer. Please see response to Ohio EPA Original Comment #2

Action: Please see action to Ohio EPA Original Comment #2.

14. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 2.3 Pg #: 2-4 Line #: 2nd paragraph Code: C
Original Comment #: 10

Comment: This paragraph discusses the FRL for nitrate/nitrite and calculates an FRL for nitrate as expressed by its equivalent nitrogen concentration. This additional step is confusing and the reason for this discussion is not immediately clear. Unless DOE can present a

convincing argument otherwise, the nitrate/nitrite FRL and concentrations in the GMA should be expressed 'straight up' and not converted to a nitrogen value.

Response: The nitrate/nitrite groundwater FRL as defined in the Operable Unit 5 Record of Decision (OU5 ROD) needs to be changed from 11 mg/L to 45 mg/L. It was established at 11 mg/L by incorrectly comparing the average background concentration of nitrate/nitrite to the maximum contaminant level (MCL) for nitrogen in drinking water, which is 10 mg/L. In reality though, 45 mg/L of nitrate/nitrite corresponds to a nitrogen concentration of 10 mg/L.

Action: No change to the report is required.

15. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 2 Pg.#: 2-7 Line #: 6 Code: C
Original Comment #: 11

Comment: A contour plot of molybdenum concentrations (above and below the FRL data) measured in the monitoring wells and the Geoprobe borings should be provided to show possible spatial trends in the data. This plot is necessary to substantiate that the statement that the exceedance observed at Geoprobe 13323 is an anomaly.

Response: A map of molybdenum concentrations, as well as a table of the data used to create the map, is attached. The attached map shows the maximum molybdenum concentrations measured in the WSA. Only three of the maximum concentrations are FRL exceedances. The FRL exceedances occur at Monitoring Well 2649 and direct-push Locations 13322 and 13323. The exceedance at direct-push Location 13323 is suspect because it is over two orders of magnitude larger than surrounding concentrations at Monitoring Wells 2027, 3027, and 2037, and as shown in the attached table, the exceedance was measured 40 feet below the water table. Had a surface source been present, shallower exceedances would be expected.

Action: No change to the report is required.

16. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 2 Pg.#: 2-7 Line #: 6 Code: C
Original Comment #: 12

Comment: Stating that the molybdenum exceedance is within the capture of the PPDD wells implies that it will be remediated by these wells. What are DOE's assumptions regarding the transport parameters for molybdenum that substantiate this statement?

Response: Assumptions regarding the Kd for molybdenum are now provided in Response to U.S. EPA General Comment #1. Molybdenum has a Kd range of 0.2 L/kg to 1.0 L/kg, considerably lower than the Kd defined for uranium (3.0 L/kg).

Action: Refer to Action to U.S. EPA General Comment #1.

17. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 2 Pg.#: 2-8 Line #: 28 Code: C
Original Comment #: 13

Comment: The manganese plume as shown on Figure 2-15 is not bounded to the east of Monitoring Well 2010. Because this well contained the largest observed manganese concentration present in the WSA, additional GMA groundwater sampling should be conducted to the east and southeast of 2010 in order to determine the extent of above-FRL concentrations in these directions.

Response: The possibility that the uranium concentration posted in Figure 2-15 for Monitoring Well 2010 was biased high due to biofouling of the well screen was discussed in the design report. Additional direct-push sampling conducted at Location 13342 does not support the high manganese concentration measured at Monitoring Well 2010. The highest concentration measured at Monitoring Well 2010 was 6.14 mg/L. The highest value measured right next to the well at direct-push Location 13342 was 1.10 mg/L. This difference in concentration is being attributed to biofouling at the well screen in

Monitoring Well 2010. Additional direct-push sampling has been conducted east of Well 2010 to define the eastern edge of the manganese plume. A new plume map is provided in the Addendum to the Waste Storage Area (Phase II) Design Report.

Action: Results of the additional direct-push sampling are incorporated into the attached Addendum to the Waste Storage Area (Phase II) Design Report.

18. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-1 Line #: 7 Code: C
Original Comment #: 14

Comment: A modeling scenario that includes a second extraction well to address the manganese plume should be conducted. Any conclusions regarding a potential remediation strategy for manganese requires supporting modeling.

Response: Additional direct-push sampling has been conducted and the manganese plume has been re-mapped. New fate and transport modeling has been conducted for the manganese plume using a Kd of 1.3 L/kg instead of 10 L/Kg. This modeling indicates that one additional extraction well will be sufficient to remediate the Mn plume.

Action: New modeling for the remediation of manganese is presented in the attached Addendum to the Waste Storage Area (Phase II) Design Report.

19. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-3 Line #: 4 Code: C
Original Comment #: 15

Comment: The document should include a figure showing the model cells where the source term was simulated, indicate the discretized values of the source term, and discuss derivation of the source term value.

Response: The total uranium source terms used in the transport model for the Waste Storage Area (Phase II) Design Report were taken from the Operable Unit 5 Feasibility Study Report. There are 17 VAM3D Zoom model nodes in the current model with total uranium source strengths and locations shown below. A location map is attached. The mass flux is in nano-pounds/day so summing over all 17 source terms, multiplying by 365 days per year and dividing by $1x10^9$ nano-pounds per pound gives a total uranium mass flux of 17.9 pounds/year in the current model.

VAM3D Transport Total Uranium Source Terms in the Waste Storage Area

VAM3D Model Node No.	K Index	J Index	I Index	Node Easting '83	Location Northing '83	Total U Mass Nano-lbs/day
66156	13	86	9	1346550.0	481500.0	2.28E+06
66206	13	87	8	1346450.0	481600.0	2.28E+06
66257	13	88	8	1346450.0	481700.0	2.28E+06
66157	13	86	10	1346650.0	481500.0	2.28E+06
66207	13	87	9	1346550.0	481600.0	2.28E+06
66258	13	88	9	1346550.0	481700.0	2.28E+06
66209	13	87	11	1346750.0	481600.0	2.28E+06
66259	13	88	10	1346650.0	481700.0	2.28E+06
66310	13	89	10	1346650.0	481800.0	2.28E+06
66210	13	87	12	1346850.0	481600.0	1.99E+06
66312	13	89	12	1346850.0	481800.0	2.28E+06
66362	13	90	11	1346750.0	481900.0	2.28E+06
66262	13	88	13	1346950.0	481700.0	2.28E+06
66313	13	89	13	1346950.0	481800.0	2.28E+06
66363	13	90	12	1346850.0	481900.0	2.28E+06
66004	13	83	10	1346650.0	481200.0	7.62E+06
66106	13	85	10	1346650.0	481400.0	7.62E+06
					Total Mass	4.92E+07

Action: No change to the plan is required.

20. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 3.3 Pg #: 3-3 Line #: middle paragraph Code: C
Original Comment #: 16
Comment: The text states, "All source terms were assumed to be zero after this time (April 2006) reflecting the soil cleanup schedule for the site and the anticipated site closure by March 2006."

We continue to maintain that the uranium contamination the area of the waste pits is the result of recent infiltration from the area near the Clearwell. We believe that there is insufficient evidence to discount the presence of residual contamination in the vadose zone.
Response: DOE agrees that there is insufficient evidence to discount the presence of residual uranium contamination in the vadose zone in the WSA, but there is also insufficient evidence to quantify a source term for the vadose zone for the purpose of modeling cleanup of the aquifer. Increasing surface infiltration in the WSA should help to flush any contamination sorbed to sediments in the vadose zone. The former Cement Pond and Clear Well areas are being targeted as infiltration points to the aquifer. Please see response to Ohio EPA Original Comment #2.
Action: No change to the report is required. Please see action to Ohio EPA Original Comment #2.

21. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 3.3 Pg #: 3-3 Line #: last paragraph Code: C
Original Comment #: 17
Comment: This paragraph discusses the relationship between clean up times and fluctuations in the water table. The conclusion is that the modeled clean up time is approximately 9 years shorter under wet boundary conditions than under dry boundary conditions.

The conclusion supports our contention that an induced infiltration strategy should be a component of the remediation of the GMA in this area.
Response: The former Cement Pond and Clear Well areas are being targeted as infiltration points to the aquifer. Please see response to Ohio EPA Original Comment #2.
Action: Please see action to Ohio EPA Original Comment #2.

22. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-4 Line #: 18 Code: C
Original Comment #: 18
Comment: The predicted rapid dissipation of greater-than-FRL concentrations for Tc-99 in the 13320 and 13322 Geoprobe locations does not appear consistent with the field data. The persistence of significant concentrations (193 and 6280 picoCures per liter [pCi/L]) at these locations indicates that the modeling should be revised to include a source term.
Response: Assuming that source term removal activities are successful, it seems more reasonable to model with current initial conditions and not use a source term. If after a few years of pumping the new extraction well, technetium concentrations are not responding to the remediation, further evaluation will be considered.
Action: No change to the plan is required.

23. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-4 Line #: 30 Code: C
Original Comment #: 19
Comment: Justification should be provided for not including a source term in the predictive transport model for manganese.
Response: This comment is similar to Ohio EPA Original Comment #18. All of the source terms in the WSA have been, or are, in the process of being removed. With sources gone, it seems more reasonable to model with current initial conditions and not use a source term. If

after a few years of pumping the new extraction well, manganese concentrations are not responding to the remediation, further evaluation will be considered.

Action: No change to the plan is required.

24. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-5 Line #: 1 Code: C
Original Comment #: 20

Comment: The Kd range for manganese noted in the text was obtained from a literature search and is non-site specific. DOE should provide a Kd assessment for the transport of manganese in the GMA that considers site geochemical and hydrogeologic characteristics.

Response: This comment is similar to U.S. EPA General Comment #1 and Ohio EPA Original Comment #3.

Action: Refer to Actions for U.S. EPA General Comment #1 and Ohio EPA Original Comment #3.

25. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-5 Line #: 10 Code: C
Original Comment #: 21

Comment: The conclusion that manganese will not respond well to pump and treat at the site is premature and requires additional justification with respect to the fate and transport characteristics assumed for this constituent.

Response: The conclusion that manganese would not respond to pump and treat at the site was based on Kd values for manganese posted in Table F.2-5 of the OU5 Feasibility Study. Additional work based on site-specific data has since been conducted. This additional work is presented in response to U.S. EPA General Comment #1 and Ohio EPA Original Comment #3.

Action: Refer to Actions for U.S. EPA General Comment #1 and Ohio EPA Original Comment #3.

26. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-5 Line #: 10 Code: C
Original Comment #: 22

Comment: The text should be revised to indicate that manganese may not respond well to conventional pump and treat operations.

Response: New information concerning the Kd of manganese indicates that manganese should respond well to conventional pump-and-treat operations. This new information is presented in response to U.S. EPA General Comment #1 and Ohio EPA Original Comment #3.

Action: Refer to Actions for U.S. EPA General Comment #1 and Ohio EPA Original Comment #3.

27. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 3.7 Pg #: 3-5 Line #: last sentence Code: C
Original Comment #: 23

Comment: The text states, "These modeling results indicate that manganese is not movable and concentrations are not expected to respond well to P&T operations."
The argument that reaches this conclusion is circular to the extent that the Kd picked to model (10 L/Kg)

Response: New site-specific information on the Kd of manganese has been used to model cleanup of the manganese plume. This new information is provided in the attached Addendum to the Waste Storage Area (Phase II) Design Report.

Action: As stated in the response.

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28. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 4 Pg.#: 4-2 Line #: 30 Code: C
Original Comment #: 24

Comment: As was stated for uranium, it also seems likely that manganese would be sorbed onto aquifer sediments above the present water table. This condition would likely result in a continuing source of elevated manganese concentrations in the aquifer.

Response: As with uranium, DOE agrees that there is insufficient evidence to discount the presence of residual manganese contamination in the vadose zone in the WSA, but there is also insufficient evidence to quantify a source term for the vadose zone for the purpose of modeling cleanup of the aquifer. Increasing surface infiltration in the WSA should help to flush any contamination sorbed to sediments in the vadose zone. The former Cement Pond and Clear Well areas are being targeted as infiltration points to the aquifer.

Action: Please see action to OEAP Original Comment #2.

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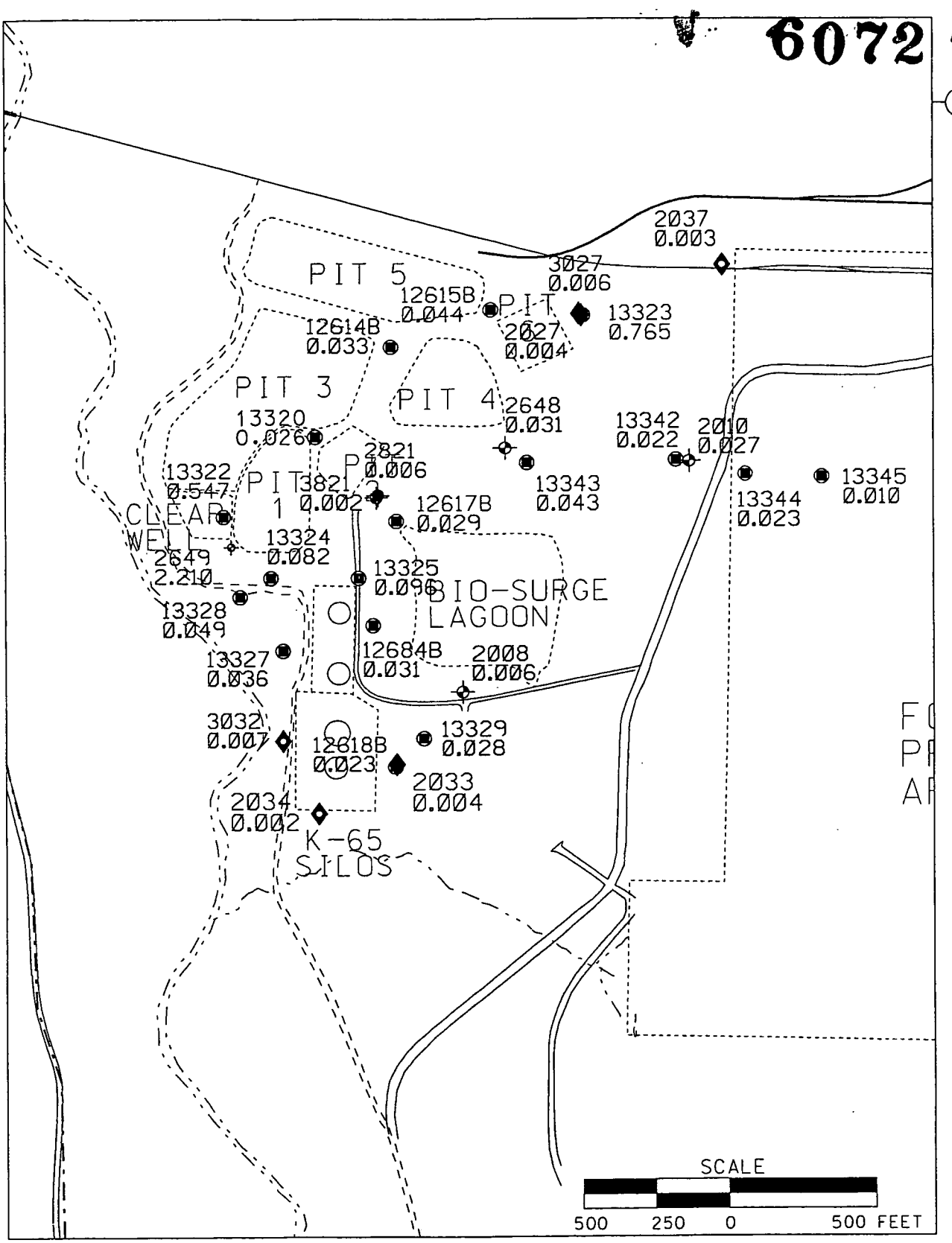
STATE PLANAR COORDINATE SYSTEM 1983

30-NOV-2005



LEGEND:

- FERNALD SITE BOUNDARY
- MONITORING WELL LOCATION
- WELL PLUGGED AND ABANDONED
- GEOPROBE LOCATION

Mo FRL = 0.1 mg/L

CONCENTRATIONS GIVEN IN mg/L

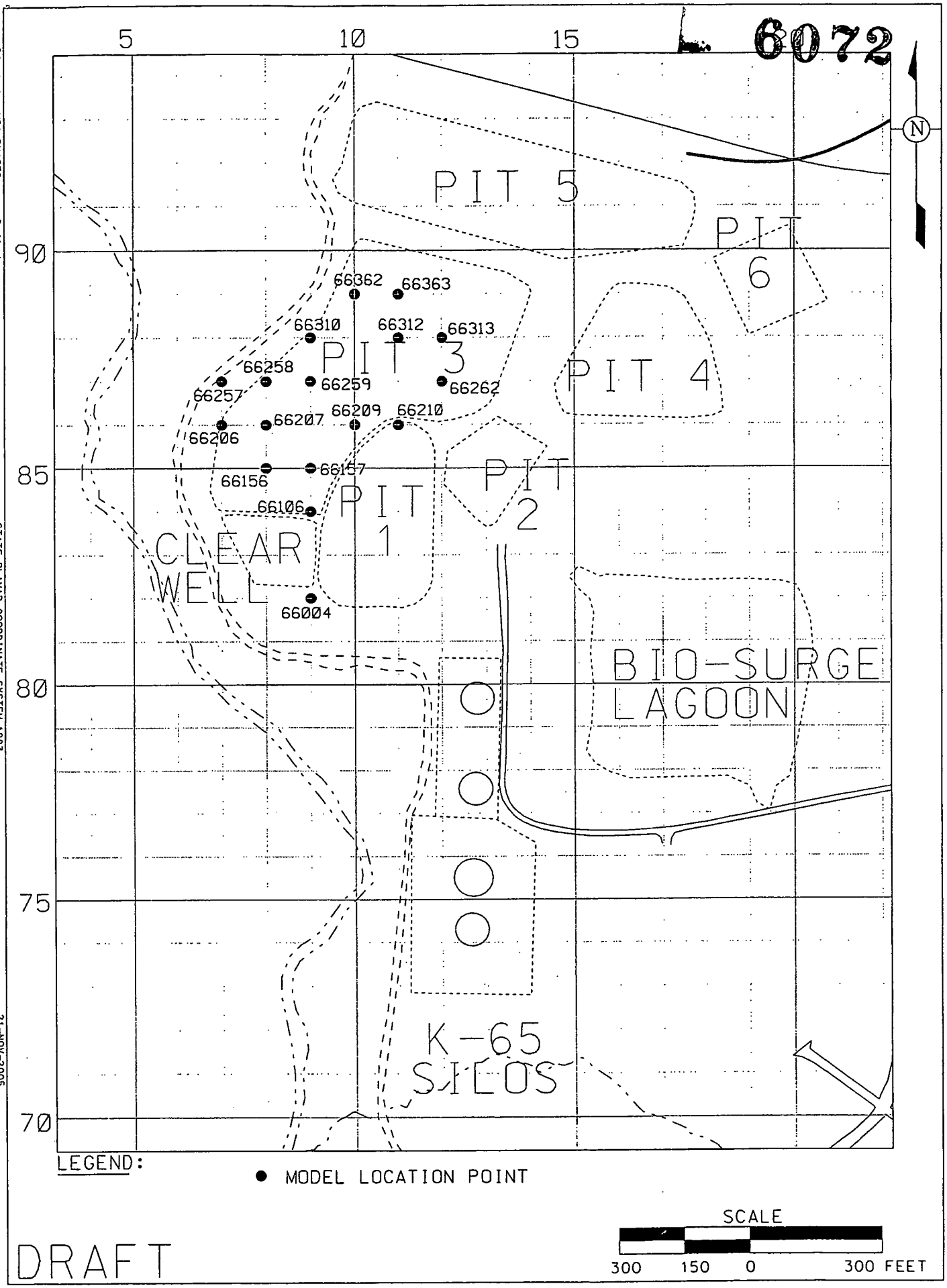
DRAFT

MAXIMUM MOLYBDENUM CONCENTRATIONS

MOLYBDENUM CONCENTRATION DATA IN THE WASTE STORAGE AREA

Well	Concentration	Units	Qualifier	Date
2037	0.003	mg/L	JB	1/14/2003
3027	0.006	mg/L	-	12/9/1997
2027	0.004	mg/L	-	6/25/2001
2648	0.031	mg/L		11/15/1990
2821	0.006	mg/L	B	6/27/2000
3821	0.002	mg/L	JB	1/13/2003
2649	2.120	mg/L		7/30/1991
2008	0.006	mg/L	B	6/26/2000
3032	0.007	mg/L	-	11/19/1997
2033	0.004	mg/L	B	12/6/1999
2034	0.002	mg/L	-	12/6/1999
2010	0.0271	mg/L	-	6/27/2000

Direct Push Location	Concentration	Units	Qualifier	Date	Feet Below Water Table
13342	0.022	mg/L		9/8/2005	60
13343	0.043	mg/L		9/15/2005	40
13344	0.023	mg/L		9/21/2005	60
13345	0.010	mg/L		10/13/2005	50
12614b	0.033	mg/L		4/19/2005	10
12615b	0.044	mg/L		12/6/2004	30
12617b	0.029	mg/L		10/19/2004	20
12618b	0.023	mg/L		10/26/2004	20
12684b	0.031	mg/L		10/7/2004	10
13320	0.026	mg/L		4/20/2005	1
13322	0.547	mg/L		4/17/2005	1
13323	0.765	mg/L		11/10/2004	40
13324	0.082	mg/L		2/23/2005	1
13325	0.096	mg/L		3/9/2005	10
13327	0.036	mg/L		3/31/2005	1
13328	0.049	mg/L		4/5/2005	20
13329	0.028	mg/L		4/13/2005	1



MODELED URANIUM SOURCE TERM LOCATIONS

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STATE PLANAR COORDINATE SYSTEM 1983

21-NOV-2005