Department of Energy

Ohio Field Office
Fernald Closure Project
175 Tri-County Parkway
Springdale, Ohio 45246
(513) 648-3155

MAR 0 7 2006

Mr. James A. Saric, Remedial Project Manager
United States Environmental Protection Agency
Region V, SR-6J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

DOE-0085-06

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
Southwest District Office
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL OF RESPONSES TO OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE ADDENDUM TO THE WASTE STORAGE AREA PHASE II DESIGN REPORT

References: 1) Letter, T. Schneider to J. Reising, "Comments on the Addendum to the Waste Storage Area Phase II Design Report," dated January 31, 2006

2) Letter, J. Reising to J. Saric and T. 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," dated December 6, 2005

Enclosed for your review and approval are responses to Ohio Environmental Protection Agency comments (Reference 1) on the Addendum to the Waste Storage Area Phase II Design Report (Reference 2).

If you have any questions regarding this transmittal, please contact me at (513) 648-3139.

Sincerely,

Johnny W. Reising
Director

Enclosure

cc w/enclosure:
Edward Skintik, DOE-OH
C. Jacobson, Stoller
M. Lutz, Stoller
J. Powell, DOE-LM/FCP
M. Cullerton, Tetra Tech
G. Jablonowski, USEPA-V, 5HRE-8J
T. Schneider, OEPA-Dayton (3 copies of enclosure)
M. Shupe, HSI GeoTrans
T. Tucker, OEPA-Columbus
R. Vandergrift, ODH
AR Coordinator, Fluor Fernald, Inc., MS6

cc w/o enclosure:
H. Bilson, Fluor Fernald, Inc., MS1
R. Abitz, Fluor Fernald, Inc., MS88
K. Broberg, Fluor Fernald, Inc., MS12
J. Chiou, Fluor Fernald, Inc., MS88
B. Hertel, Fluor Fernald, Inc., MS12
F. Johnston, Fluor Fernald, Inc., MS12
D. Nixon, Fluor Fernald, Inc., MS1
K. Voisard, Fluor Fernald, Inc., MS12

RESPONSES TO OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE ADDENDUM TO THE WASTE STORAGE AREA PHASE II DESIGN REPORT

FERNALD CLOSURE PROJECT
FERNALD, OHIO

MARCH 2006

U.S. DEPARTMENT OF ENERGY

RESPONSES TO OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE ADDENDUM TO THE WASTE STORAGE AREA PHASE II DESIGN REPORT

GENERAL COMMENTS:

1. Commenting Organization: Ohio EPA Commenter: OFFO
Section #: Pg #: Line #: Code: G
General Comment #: 1
Comment: We are writing these comments with the assumption that the contamination in the wells monitoring the perched system to the northeast portion of the Waste pits is indeed a limited, perched system. Should that prove not to be the case and remediation of the perched system becomes necessary, please specify what documents or submittals will address the remediation of the perched system.
Response: Remediation of perched groundwater in the Waste Storage Area will be addressed in the Waste Pit General Area Certification Report
Action: No action required.

2. Commenting Organization: Ohio EPA Commenter: GeoTrans, Inc.
Section #: 1.0 Pg #: 1 Line #: 27 Code: C
General Comment #: 2
Comment: The sample used to investigate speciation was collected from Geoprobe 13342, located in very close proximity to Monitoring Well 2010, a well that is believed to have been impacted by biofouling. The occurrence of biofouling is inferred from the observed elevated manganese concentrations in this well relative to the Geoprobe sample. The speciation analysis, therefore, is likely representative of biofouled aquifer near the well. Assuming that the affects of biofouling are highly localized to the immediate vicinity of the affected monitoring wells, the resulting kd determined from this analysis is, therefore, questionable regarding to its general applicability to aquifer that is unimpacted by biofouling. For example, where biofouling is actively occurring, Cullimore (1993) indicates that oxidizing or precipitating bacteria within the bacterial growth cause the precipitation of iron and manganese oxides while iron reducing bacteria cause the release of iron and manganese back into solution. In order to determine manganese speciation that is more representative of the aquifer (e.g., away from isolated locations that are biofouled), therefore, groundwater speciation and kd determination analyses should also consider groundwater samples collected from a non-biofouled portion of the aquifer.
Response: The manganese Kd provided in the addendum was not determined using data from direct-push Location 13342 and is considered to be representative of the aquifer. The new manganese Kd was determined using data from a Sandia National Lab Study (Bryan, et. al. 2004) collected at Extraction Well 33262 (EW-15a). A map is attached showing location 33262. The data used to determine manganese speciation were collected from direct-push Location 13342. Since the manganese concentration measured at Location 13342 (1.10 mg/L) is much lower than the concentration measured at Monitoring Well 2010 (6.14 mg/L) it appears that the bioaccumulation of manganese does not extend as far as direct-push location 13342 or it is drastically reduced at Location 13342. As the comment requests, speciation was also determined at a location from a non-biofouled portion of the aquifer (Direct-push Location 13345) and compared to results from Location 13342. Direct-push Location 13345 is located outside of the manganese plume and approximately 500 feet east of Monitoring Well 2010. Comparison of the results from both locations (provided below) indicates that they are in good agreement.

LOCATION 13345
Aqueous species accounting for 99% or more of Mn++

Species	Factor	Molality	Per Cent
Mn++	1.00	3.2239E-06	87.20
MnCO3(aq)	1.00	2.5664E-07	6.94
MnSO4(aq)	1.00	1.2098E-07	3.27
MnHCO3+	1.00	9.4404E-08	2.55
Total		3.6971E-06	99.97

LOCATION 13342
Aqueous species accounting for 99% or more of Mn++

Species	Factor	Molality	Per Cent
Mn++	1.00	1.6948E-05	84.60
MnCO3(aq)	1.00	1.9329E-06	9.65
MnSO4(aq)	1.00	6.1564E-07	3.07
MnHCO3+	1.00	5.2893E-07	2.64
Total		2.0034E-05	99.96

Action: No action required.

3. Commenting Organization: Ohio EPA Commenter: GeoTrans, Inc.
Section #: 3.0 Pg #: 4 Line #: 6 Code: G
General Comment #: 3
Comment: The text indicates that the difference between the manganese concentrations in Monitoring Well 2010 and Location 13342 implies that biofouling is occurring in the vicinity of this well. In addition, the text indicates that the net result of this biofouling is the concentration of manganese around the well screen. Metallic compounds are often bioaccumulated in a sequential manner around water wells. Iron and zinc concentrate very close to the well screen, while manganese accumulates further out (Cullimore, 1993). The results from Geoprobe 13342, however, seem to contradict the anticipated pattern. In addition, biofouling is not inferred at other Waste Storage Area monitoring wells (2649, 3009, 2008, 2034, etc.) monitored (and therefore pumped) for a similar period as was done for Monitoring Well 2010. Given the significant implication of biofouling to the interpretation of site characterization data, DOE should conduct the appropriate testing on the suspected monitoring wells to verify that biofouling is occurring and is responsible for the observed elevated manganese concentrations.

Response: Manganese concentration and sample turbidity suggests that biofouling is occurring at Monitoring Well 2010. Water samples collected from Monitoring Well 2010 are extremely turbid and contain heavy black sediment. Greatly reduced manganese concentrations at direct-push Location 13342 indicate that the biofouling is very close to the monitoring well. Therefore, the sequential bioaccumulation appears to be occurring within a very short distance from the well. The possibility of biofouling occurring at monitoring wells 2649, 3009, 2008, 2034, etc., was not addressed because it is less of a concern at those locations. Relative to the manganese concentrations at Monitoring Wells 2010 and 2648 the concentrations measured at those wells were much lower. Of concern was the large area of the manganese plume with a concentration > 4 mg/L, shown in Figure 2-1 of the design report. The direct-push sampling results reported in the addendum to the design report show

the high manganese concentrations are limited to the wells and are not widespread. With the exception of the high concentrations measured at Monitoring Wells 2010 and 2648 (6.14 mg/L and 4.08 mg/L respectively) all of the other high manganese concentrations measured at the other monitoring wells in the Waste Storage Area were used in the groundwater modeling that was conducted to determine the Phase II design in the addendum.

Action: DOE will continue to monitor for manganese and consider additional testing should manganese concentration in the area not respond to the remedy as predicted.

4. Commenting Organization: Ohio EPA Commenter: GeoTrans, Inc.
Section #: 3.0 Pg #: 4 Line #: 20 Code: C
General Comment #: 4

Comment: With a known manganese source (the waste pits) in the vicinity, the speculation of a naturally occurring geologic condition as the source of the deep FRL exceedances is inappropriate absent significant additional characterization data. Review of all Waste Storage Area Phase II Geoprobe characterization results, for example, shows that nine of 25 (36 percent) samples with manganese FRL exceedances are from samples collected from depths of over 40 feet below the water table. The Geoprobes at which the deep FRL exceedances occur (13324, 13325, 13327, 13343, 13342, 13344, and 133345) are oriented roughly east to west along a likely migration pathway down gradient from the waste pits. Data to substantiate a natural source should at minimum include sampling upgradient from the waste pits.

Response: The speculation is based on the observation that many of these deep exceedances are not associated with shallow exceedances. It is difficult to describe a model that would place manganese contamination deep in the aquifer without overlying contamination being present. As stated in the addendum, all deep exceedances were considered in producing the new maximum manganese plume map provided in the addendum. The deep maximum manganese concentrations were also used as initial conditions for the groundwater modeling presented in the Phase-II Design Report and the Addendum.

Action: No action required.

5. Commenting Organization: Ohio EPA Commenter: GeoTrans, Inc.
Section #: 4 Pg #: 5 Line #: 7 Code: C
General Comment #: 5

Comment: DOE should conduct a simulation that includes a second more northern extraction well. The results from this simulation are needed to support the rationale that the additional well is unnecessary. Ohio EPA believes that the remediation time would be shortened by using two extraction wells and that the aquifer would be remediated sooner.

Response: Figure 3-18 in the Waste Storage Area Phase II Design Report illustrates that the aquifer would not be cleaned up sooner with an additional extraction well installed north of the proposed extraction well. At year 2022, above FRL concentrations are still present in the Pilot Plant Drainage Ditch area and the former silos area. An additional well located to the north of the proposed well would pull water from the northwest and not affect the area to the south that is still above the FRL in 2022.

Action: No action required.

6. Commenting Organization: Ohio EPA Commenter: GeoTrans, Inc.
Section #: 4 Pg #: 5 Line #: 22 Code: C
General Comment #: 6

Comment: DOE should provide a figure showing particle tracking results from the single extraction well proposed in relation to the revised manganese plume.

Response: Two figures are attached. One shows particle paths from 2006 to 2015, and the second shows particle paths from 2015 to 2022.

Action: As stated in response.

7. Commenting Organization: Ohio EPA Commenter: GeoTrans, Inc.
Section #: 4 Pg #: 5 Line #: 28 Code: C
General Comment #: 7

Comment: Assuming that biofouling is in fact the reason for the observed elevated manganese concentrations in the monitoring wells, DOE should discuss any potential ramifications on the long term implementation of pump and treat remediation in the Waste Storage Area. Specifically,

- How far will greater-than-FRL manganese concentrations extend from extraction wells after many years of intense, continuous pumping? How will any resulting pockets of contamination be addressed?
- How will manganese remediation progress be monitored given that observed concentration increases can be attributed to biofouling?
- Given the biofouling problems experienced in site extraction wells at large, will the elevated manganese concentrations in the Waste Storage Area in any way compromise remedy effectiveness by causing a greater incidence of screen/formation plugging?

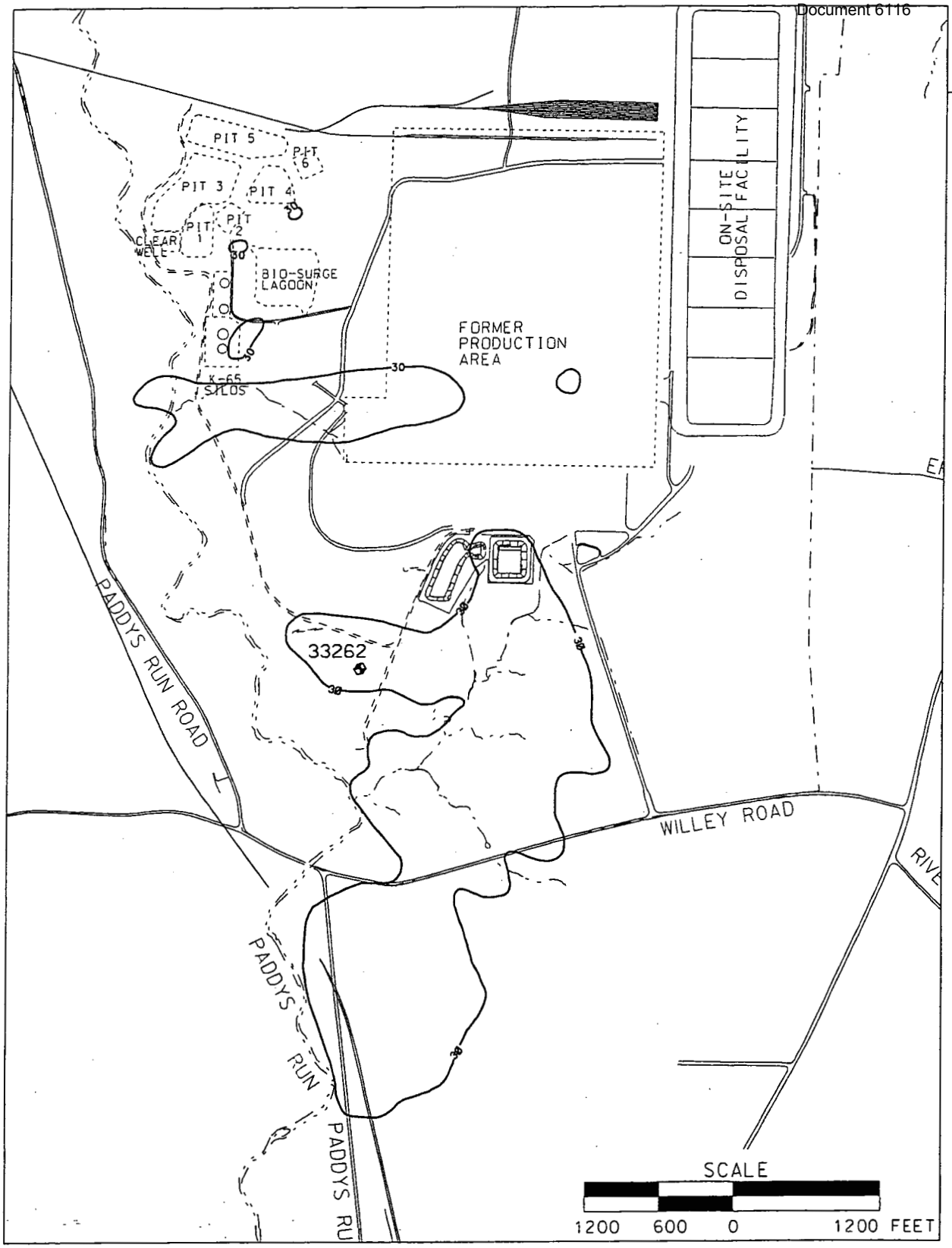
Response: So far, the bioaccumulation of manganese has only been detected at monitoring wells. If it should occur at the planned extraction well it is not known how far the bioaccumulation will extend or whether or not it will impact operation of the well. The project has developed and implemented an extraction well rehabilitation program that successfully alleviates the plugging of extraction well screens and the surrounding formation caused by biofouling. There is no reason to believe that the bioaccumulation of manganese is not also alleviated through rehabilitation efforts. Periodic rehabilitation of the extraction wells limits the extent to which manganese can bioaccumulate around the extraction wells. Well rehabilitations serve to kill and break up the biozones in the vicinity of the extraction wells, and subsequent pumping removes the dead/broken up organic material and any associated accumulations of inorganic constituents such as manganese and zinc.

When deemed necessary, the extent of manganese FRL exceedances at groundwater monitoring wells will be assessed on a well-by-well basis through the use of direct-push sampling. This approach has already shown that the bioaccumulation of manganese around Monitoring Well 2010 appears to be very localized and is either greatly reduced at direct-push Location 13342 or does not extend there. If the bioaccumulation of manganese around a monitoring well in the Waste Storage Area is confirmed through direct-push sampling to be causing an FRL exceedance, the biofouled well would no longer be used to monitor remedy performance. Instead, direct-push samples will be collected from the area, but outside of the influence of the biofouled well. FRL exceedances measured at the biofouled well would not be a good indicator for assessing remediation of the overall manganese plume. Direct-push samples collected outside of the influence of the biofouled well will provide a better assessment of overall remediation progress.

Action: As stated in the response.

REFERENCES:

Cullimore, D.R., 1993. Practical Manual of Groundwater Microbiology. Lewis Publishers, Boca Raton, Florida.



LEGEND:

— · — · — FEMP BOUNDARY

EXTRACTION WELL

MAX TOTAL URANIUM CONTOUR FROM SECOND QUARTER 2002 30 μg/L

KD SAMPLE LOCATION USED IN SANDIA STUDY

V:/5FCP1/DGN/WSA-PHASE2-45.dgn

STATE PLANAR COORDINATE SYSTEM 1983

17-FEB-2006

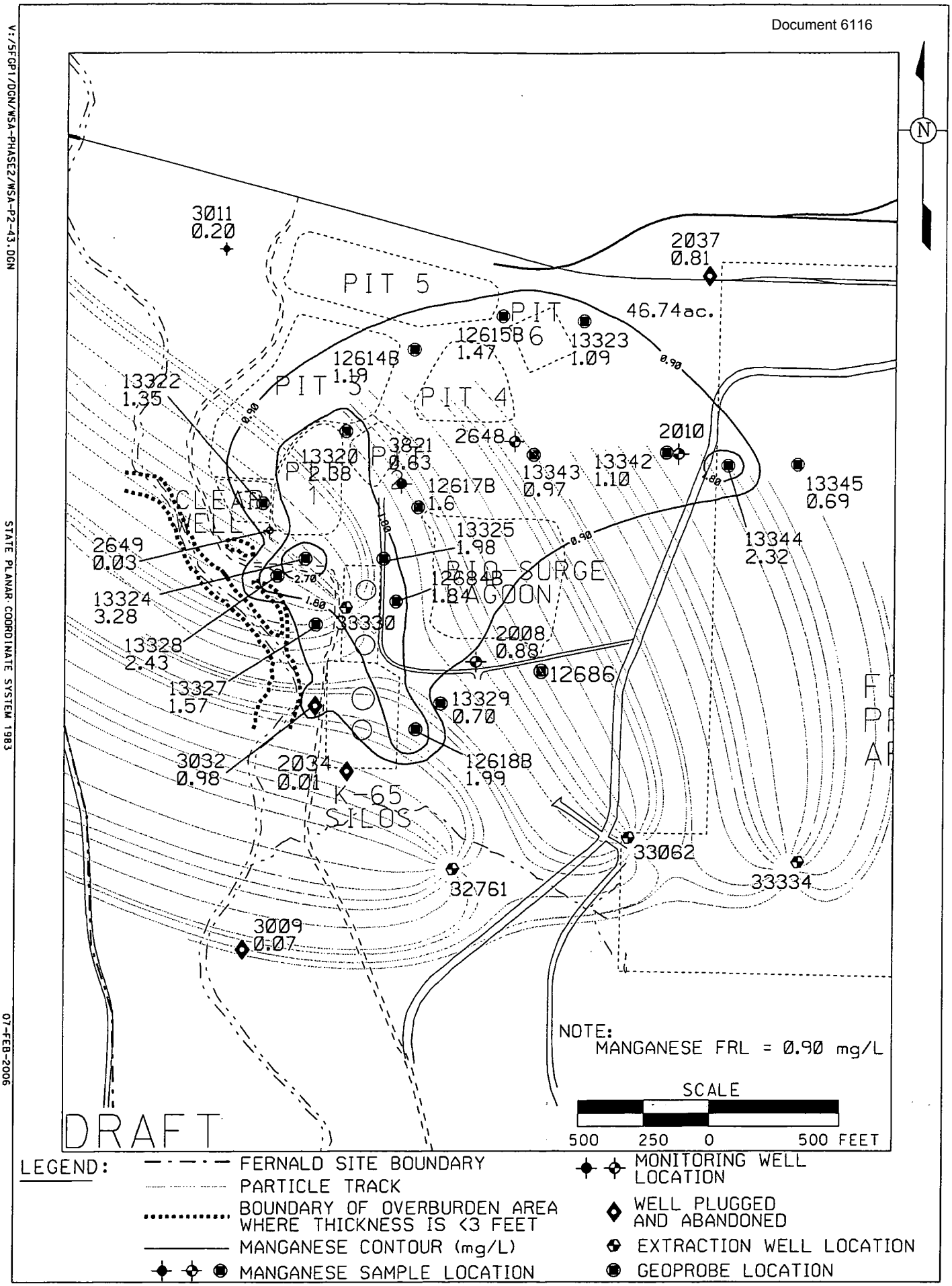


FIGURE 1. WASTE STORAGE AREA MAXIMUM MANGANESE PLUME AND NON-RETARDED 10-YEAR REVERSE PARTICLE TRACKS UNDER PUMPING CONDITIONS FROM 2006 TO 2015

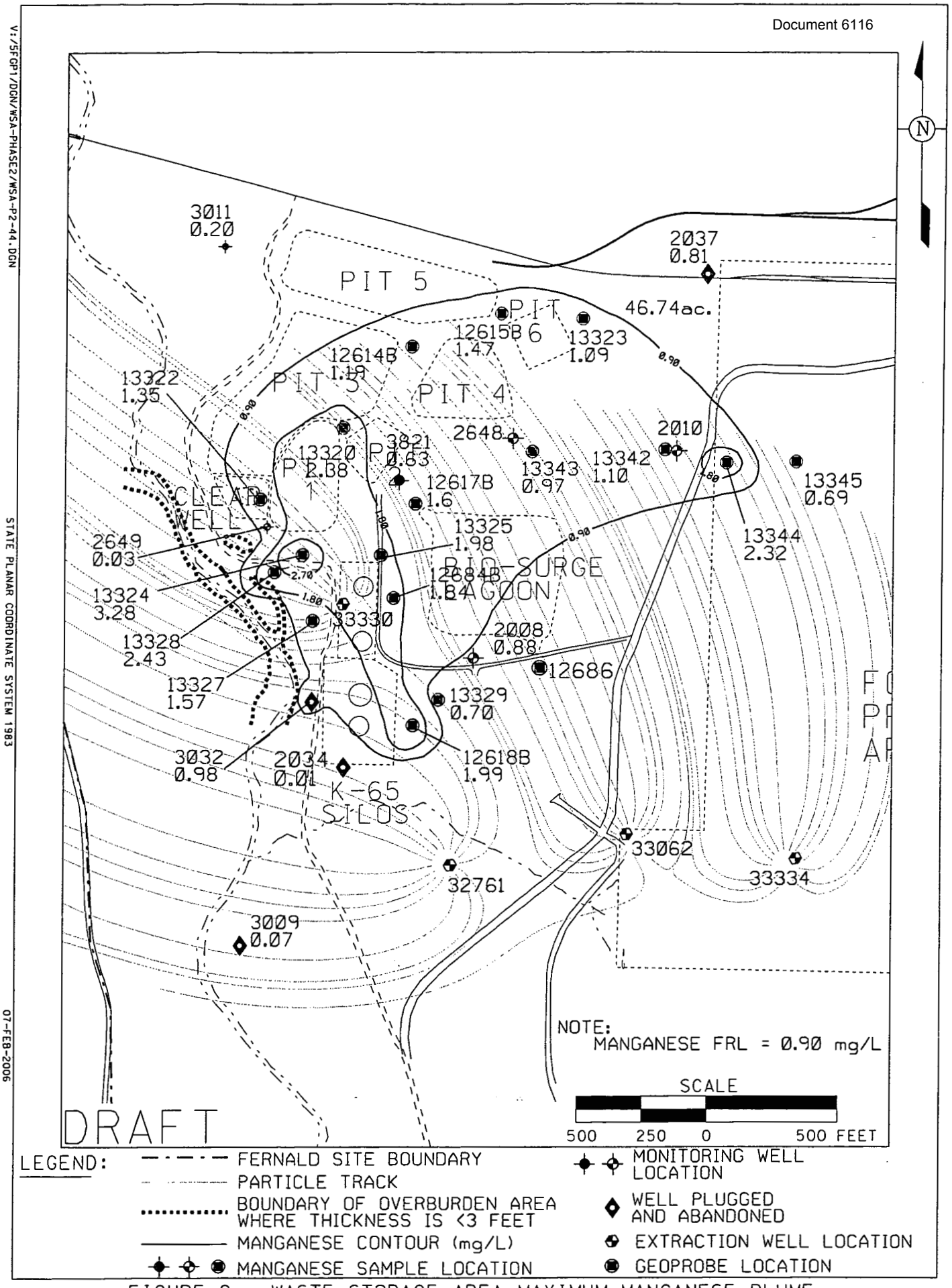


FIGURE 2. WASTE STORAGE AREA MAXIMUM MANGANESE PLUME AND NON-RETARDED 10-YEAR REVERSE PARTICLE TRACKS UNDER PUMPING CONDITIONS FROM 2015 TO END OF REMEDY