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DATA SUMMARY LETTER REPORT FOR EVENTS 1 AND 2 OF SOIL AND GROUNDWATER SAMPLING AT ANIMAL AND PLANT HEALTH INSPECTION SERVICE FACILITY NCBC GULFPORT MS

1/19/2007

TETRA TECH NUS

TtNUS/TAL-07-008/0293-5.0

January 19, 2007

Commander, Southeast
Naval Facilities Engineering Command, Southeast
Attn: Mr. Harold McGill
2155 Eagle Drive
North Charleston, South Carolina 29406

Reference: Clean Contract No. N62467-04-D-0055
A/E Contract No. N62467-01-D-0396
Contract Task Order No. 0012

Subject: Data Summary Letter Report – Events I and II
United States Department of Agriculture
Animal and Plant Health Inspection Service Facility
Gulfport, Mississippi

Dear Mr. McGill:

Tetra Tech NUS, Inc. (TtNUS), under contract to the United States Department of the Navy, Naval Facilities Command Southeast (NAVFAC SE), has prepared this Data Summary Letter Report in support of the Expanded Site Investigation (ESI) for the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) in Gulfport, Mississippi. This report was prepared under the Comprehensive Long-term Environmental Action Navy (CLEAN) IV, Contract No. N62467-04-D-0055.

INTRODUCTION

This letter report presents and summarizes the analysis of soil and groundwater samples collected at the USDA APHIS Facility in Gulfport, Mississippi. The goal of the ESI is to fill data gaps identified during the Site Investigation (SI) which in turn allows for a more thorough evaluation of the source(s) of contamination, the impacted media, and the potential transportation and migration pathways. The groundwater and soil data discussed below further characterizes the contaminants of concern identified in the Site Investigation Report (TtNUS, 2005).

FIELD ACTIVITIES

Field activities were conducted in accordance with the ESI Work Plan Addendum Letter (TtNUS, 2006) and the Site Specific Health and Safety Plan (TtNUS, 2006). Detailed descriptions of field procedures are located in the SI Work Plan (TtNUS, 2004).

Field activities conducted for this ESI included:

- Direct Push Technology (DPT) subsurface soil sampling
- Monitoring well installation
- Groundwater sampling

Sampling and analysis was conducted in two events, discussed in detail below. Event I includes both the subsurface soil samples collected June 27-28, 2006 and groundwater samples collected July 17-18, 2006. Event II consists only of a second groundwater sampling event on September 26-27, 2006.

Analytical data from the ESI were used to evaluate the nature and extent of contamination. The environmental samples were analyzed for a broad range of volatile organic compounds (VOCs), Semi-volatile organic compounds (SVOCs), pesticides/PCBs, herbicides, and metals (Table 1). The analytical results from the samples collected at the USDA APHIS facility were compared to their respective (TRGs) – both restricted (industrial) and unrestricted (residential).

Table 1
Analytical Parameters

Parameter	Method	No. Soil	No. Aqueous
Event I			
VOC's	8260	6	6
SVOC's	8270	N/A	3
Pesticides	8081	6	6
Herbicides	8151	6	3
Metals	6010	N/A	3
Event II			
VOC's	8260	N/A	6
SVOC's	8270	N/A	3
Pesticides	8081	N/A	6
Herbicides	8151	N/A	3
Metals	6010	N/A	3

EVENT I
The following field activities were included in the Event I investigation:

- Soil Characterization
- Monitoring Well Installation
- Groundwater Sampling

Soil Characterization

Six direct push technology (DPT) borings (Figure 1) were advanced on June 27-28, 2006 and one subsurface soil sample was collected from each boring based on head space analysis. Selection of DPT boring locations was based on the results of previous delineation and characterization activities. Three of the soil borings (ESI-03, ESI-04, and ESI-06) were placed on the upgradient (western) side of the facility to determine if contaminants were encroaching from an offsite source. ESI-02 was placed on the northeast corner of the facility to fill in a potential data-gap. ESI-05 was placed near the greenhouse; its location was based on historical practices at the facility that included the long-term storage of pesticide treated plant matter (root-balls). ESI-01 was placed in the south side of the facility in the area of historical dieldrin detections in MW-03. Table 2 shows the depth at which each soil boring was collected.

Table 2
Soil Boring Sample Depths

Sample ID	**ESI-01**	**ESI-02**	**ESI-03**	**ESI-04**	**ESI-05**	**ESI-06**
Depth(feet)	5-10	4-8	4-8	32-36	0-4	4-8

Subsurface soil samples were analyzed for VOCs, pesticides/PCBs, and herbicides (Table 1). Figure 2 shows the exceedances at each of the six soil boring locations.

The analytical tables in Appendix A show the tabulated results of the six subsurface soil samples collected on June 27-28, 2006, as well as the summary statistics (mean, range, frequency of detection, etc.) of the six subsurface soil samples. A summary of the results is as follows:

- Dichloro-diphenyl-trichloroethane (DDT) was detected in four of the six samples. One sample, ESI-04 (8.4 mg/kg), exceeded the Mississippi Department of Environmental Quality (MDEQ) Tier 1 Unrestricted Target Remedial Goal (TRG) of 1.88 milligram per kilogram (mg/kg). The TRG table is provided in the Appendix.

- Dieldrin was detected in five of the six samples. One sample, ESI-04 (.068 mg/kg), exceeded the MDEQ Tier 1 unrestricted TRG of .0399 mg/kg.

Monitoring Well Installation

Three monitoring wells (MW-04, MW-05, and MW-06) were installed on June 27-28, 2006 (Figure 1) to provide additional monitoring locations for the evaluation of groundwater contaminants and potentiometric surface flow. The three new monitoring wells were installed on the western (upgradient) side of the facility based on the results of previous delineation and characterization activities as well as the locations of potential off site contamination. Monitoring well construction details are summarized in Table 3.

Table 3
Monitoring Wells Summary

Well ID	MW-01	MW-02	MW-03	MW-04	MW-05	MW-06
Date of Installation	2/18/2004	2/18/2004	2/18/2004	6/27/2006	6/28/2006	6/28/2006
Total Depth	12.38	12.45	12.10	13.69	30.16	19.07
Screen Length	10	10	10	5	5	5
(TOC) Elevation	29.59	30.37	28.88	31.90	31.80	31.15
Depth to Groundwater (7/17/2006)	4.72	5.45	5.02	6.77	6.90	6.58
Groundwater Elevation (7/17/2006)	24.87	24.92	23.86	25.15	24.90	24.57

Figure 3 illustrates the potentiometric surface flow at the USDA Facility. Groundwater flow direction was determined using elevation data from all six monitoring wells and appears to be

moving in a southeasterly direction. Table 4 summarizes the groundwater data (collected June 17, 2006) used to derive potentiometric flow.

Table 4
Groundwater Data

Well	Elevation of Reference Point	Depth to Groundwater (7/17/06)	Groundwater Elevation (7/17/06)
MW-01	30.68	5.71	24.97
MW-02	31.46	6.62	24.84
MW-03	30.00	6.01	23.99
MW-04	31.92	6.77	25.15
MW-05	31.80	6.90	24.90
MW-06	31.15	6.58	24.57

Groundwater Sampling

The first groundwater sampling event was conducted on July 17-18, 2006. The analyses from monitoring wells MW-01, MW-02, and MW-03 include VOCs and pesticides. Monitoring wells MW-04, MW-05, and MW-06 were analyzed for a full suite of analyses; VOCs, SVOCs, pesticides, herbicides, and metals (Table 1). Figure 2 shows exceedances (if any) at each of the six monitoring wells sampled on July 17-18, 2006.

The analytical tables in Appendix A show the tabulated results of the six groundwater samples collected from MW-1 through MW-6 on July 17-18, 2006, as well as the summary statistics (mean, range, frequency of detection, etc.) of the six groundwater samples collected. A summary of the results is as follows:

- Dieldrin was detected in one of the six wells. The sample drawn from MW-3 [0.94 micrograms per liter (ug/l)] exceeded the MDEQ Tier 1 TRG of .00419 ug/l. *Note- A groundwater sample drawn from this well on February 19, 2004 exhibited a Dieldrin exceedance of 0.95 ug/l.

- Chloroform was detected in one of the six wells. The sample drawn from MW-3 (0.26 ug/l) exceeded the MDEQ Tier 1 TRG of .155 ug/l. *Note- A groundwater sample drawn from this well on February 19, 2004 exhibited a Delta-BHC exceedance of 0.89 ug/L.

- Delta-BHC was detected in one of the six wells. The sample drawn from MW-3 (0.065 ug/l) exceeded the MDEQ Tier 1 TRG of .0372 ug/l. *Note- A groundwater sample drawn from this well on February 19, 2004 had a Delta-BHC exceedance of .055 ug/l.

- Beta-BHC was detected in one of the six wells. The sample drawn from MW-3 (0.13 ug/l) exceeded the MDEQ Tier 1 TRG of .0372 ug/l.

- Iron was detected in MW-4, MW-5, and MW-6. The sample drawn from MW-4 (26,900 ug/l exceeded the MDEQ Tier 1 TRG of 11,000 ug/l.

- Manganese was detected in MW-4, MW-5, and MW-6. The sample drawn from MW-4 (1060 ug/l) exceeded the MDEQ Tier 1 TRG of 730 ug/l.

EVENT II
Event II includes a second groundwater sampling event to the ESI; conducted on September 26-27, 2006.

Groundwater Sampling

The second round of groundwater sampling was conducted on September 26-27, 2006. The analyses from monitoring wells MW-01, MW-02, and MW-03 include VOCs and pesticides. The analyses from monitoring wells MW-04, MW-05, and MW-06 were analyzed for a full suite of analyses; VOCs, SVOCs, pesticides, herbicides, and metals (Table 3). The results of the groundwater investigation are discussed below. Figure 4 shows exceedances at each of the six monitoring wells sampled on September 26-27, 2006.

The tables in Appendix A show the tabulated results of the six groundwater samples collected from MW-1 through MW-6 on September 26-27, 2006, as well as the summary statistics (mean, range, frequency of detection, etc.) of the six groundwater samples. A summary of the results is as follows:

- Dieldrin was detected in two of the six wells. The sample drawn from MW-2 [0.77 micrograms per liter (ug/L)] exceeded the MDEQ Tier 1 TRG of .00419 ug/L. The sample drawn from MW-3 [1.4 micrograms per liter (ug/L)] also exceeded the MDEQ Tier 1 TRG of .00419 ug/L.

- Chloroform was detected in one of the six wells. The sample drawn from MW-3 (0.24 ug/L) exceeded the MDEQ Tier 1 TRG of .155 ug/L.

- Alpha-BHC was detected in one of the six wells. The sample drawn from MW-3 (0.051 ug/L) exceeded the MDEQ Tier 1 TRG of .0106 ug/L.

- Beta-BHC was detected in one of the six wells. The sample drawn from MW-3 (0.17 ug/L) exceeded the MDEQ Tier 1 TRG of .0372 ug/L.

- Iron was detected in MW-4, MW-5, and MW-6. The sample drawn from MW-4 (28,800 ug/L) exceeded the MDEQ Tier 1 TRG of 11,000 ug/L.

- Manganese was detected in MW-4, MW-5, and MW-6. The sample drawn from MW-4 (844 ug/L) exceeded the MDEQ Tier 1 TRG of 730 ug/L.

DISCUSSION

Based on the results discussed above, there were two groups of chemicals that were retained as contaminants of potential concern (COPC): they are pesticides and inorganics. One VOC, chloroform, exceeded screening values and will be evaluated as a COPC as well. The following section examines the chemical and physical nature of the COPCs and discusses potential sources and the eventual fate of these chemicals in the environment.

PESTICIDES
Pesticides were detected in soil, groundwater, and sediment samples at Site 5. Pesticides typically enter the environment by spraying, dusting, or direct application to the soil either intentionally or by accidental spills/disposal. Pesticides, as a class of compounds, are not

considered to be very mobile in the environment. Upon application or disposal, they tend to remain affixed to soil particles. Migration or transport generally occurs through erosion via the action of wind or surface water.

Regardless of the method of application, the soil is the ultimate receptor for these chemicals. Surface soil runoff may carry pesticides to adjacent surface water bodies, which in turn forms a layer in the sediment. Erosion of surface soil at the USDA APHIS Facility has not been observed.

In general, the half lives for the pesticides reported at this site are in periods of months to years. The specific pesticides detected at the USDA facility are discussed below.

- **4,4' DDT and its metabolites** are considered to be persistent chemicals. They undergo extensive adsorption to soil and are not highly soluble. Biodegradation may occur under both aerobic and anaerobic conditions in the presence of certain soil microorganisms. Under aerobic conditions, 4,4'-DDT may be transformed to dichlorodiphenyldichloroethylene (DDE) and, under anaerobic conditions, 4,4'-DDD may result. These compounds are, however, somewhat volatile, with a reported half life of 100 days for 4,4'-DDT. These compounds are highly lipophilic and therefore readily bioaccumulate. 4,4'-DDT is no longer in production in the United States.

- **Aldrin** is readily converted to **dieldrin**. Dieldrin is a particularly persistent pesticide but is no longer registered for general use. In soil, dieldrin will persist for long periods of time (more than 7 years) and may slowly evaporate. It does not readily leach to groundwater. Once in surface waters (via runoff), dieldrin adsorbs strongly to sediments and bioconcentrates and slowly photodegrades. Biodegradation and hydrolysis are not significant.

- **BHC**, commonly referred to as the insecticide **lindane**, is an organochlorine insecticide that metabolizes into alpha, beta, delta, and gamma isomers. Lindane is immobile, persistent, and is readily absorbed by organic matter. An increase in organic matter subsequently increases its persistence. Increased degradation of lindane is particularly influenced by high soil pH. Soil conditions at the APHIS facility include both high organic content and low pH, which indicates high (long-term) persistence but low mobility.

In total, 11 pesticides were detected in the subsurface soil. At least one pesticide was detected in 5 of the samples collected with a maximum of 8 were detected in 2 samples (ESI-04 and ESI-05). The maximum concentrations of 7 of the detected pesticides were found in one sample ESI-04. The maximum concentration of the 4 remaining pesticides was detected in sample ESI-05. The maximum concentrations and the highest number of detections were generally found in the western part of the facility.

Eleven pesticides were detected in the groundwater. The maximum concentrations of 9 of the detected pesticides were found in sample MW-03. The maximum concentration of the 2 remaining pesticides were detected in MW-02 (Methoxychlor) and MW-05 (4,4' DDD).

Given the physical nature of pesticides, these results indicate that the most likely source for these pesticides is in the area near ESI-04 and ESI-05, in the western portion of the facility. Without a strong solvent, these pesticides will not migrate or pose a significant threat to drinking water supplies in the area.

INORGANICS

Metals are highly persistent environmental contaminants. They do not biodegrade, photolyze, hydrolyze, etc. The major fate mechanisms for metals are adsorption to the soil matrix (as compared to being part of the soil structure) and bioaccumulation. Because inorganics are frequently incorporated into the soil matrix and remain bound to particulate matter, they tend to migrate via bulk movement processes such as erosion. The metals detected in groundwater samples are likely to be representative of suspended soil material in the samples.

Fourteen inorganics were detected in the groundwater. Iron and manganese were detected in one groundwater sample at concentrations exceeding the TRGs. Arsenic was also reported above the TRG. However, all of these results all fall within the MDEQ recognized range for background values for coastal zone soil. Given the history of this facility and these results, inorganics should be removed as a COPC in any future investigation.

VOLATILE ORGANIC COMPOUNDS

Chloroform has been consistently detected at levels just above drinking water criteria in MW-3. The chloroform contamination appears to be isolated to a very small area near MW-3. In addition, the reported levels of chloroform have not increased during three rounds of sampling and the low frequency of detection offer clear evidence that there is not a significant source area nearby. While this evidence could lead to a removal as a COPC, the potential exists that chloroform may be linked to either the pesticides described in this report, or facility laboratory operations. In particular, chloroform has been used as an intermediate in the manufacture of certain pesticides and fumigants and the Agency for Toxic Substances and Disease Registry (ATSDR) also lists chloroform as a common laboratory contaminant introduced during chemical extraction and analysis.

In general, chloroform readily dissolves in groundwater, may be mobile in certain conditions, and is persistent in the environment once dissolved in groundwater. For this facility, groundwater is shallow and has a low hydraulic gradient. Therefore a chloroform release would rapidly disperse in groundwater, persist, and remain close to the release due to observed low groundwater gradient.

Since chloroform may act as an indicator of disposal or spills it will be retained as a COPC. No other VOCs will be retained as COPCs.

CONCLUSIONS

In summary, this ESI has identified the need to further characterize the presence of pesticides in both the groundwater and subsurface soil. It is clear from this study, and those proceeding, that SVOCs, PCBs, and inorganics should no longer be considered contaminants of potential concern. Chloroform will be retained as a COPC as a potential indicator of release(s) and or spills of pesticides or laboratory chemicals.

The results of the soil investigation indicate that the pesticides DDT and dieldrin, (which rapidly breaks down from Aldrin), are present above MDEQ screening levels. At these levels, MDEQ would be interested in a delineation of the extent of contamination but would not likely require any remedial activities. DDT and dieldrin are stable compounds that do not readily migrate in the environment without the presence of a strong solvent, and the lack of any VOC contamination makes significant migration unlikely. ATSDR fact sheets for these compounds are provided in the appendix.

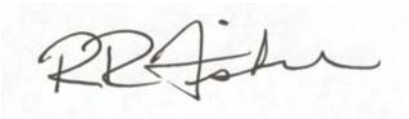
Given the uncertainties with the source and extent of pesticide contamination, the USDA should conduct one further phase of the ESI to determine the extent of pesticide contamination. The additional soil sampling should focus on the area near ESI-04.

As stated earlier, the results of the groundwater sampling confirm the absence of any large-scale VOC or SVOC plume associated with the USDA APHIS facility. The dieldrin exceedance in the groundwater collected from MW-3 is consistent with previous investigations; likely the result of the collection of fine organic particles (which the dieldrin is bound) at that location. The dieldrin exceedance in the groundwater collected from MW-2 is also the result of organic particles drawn into the collected sample. The Groundwater Sampling Log for this sample (USDAGW0203, collected September 26, 2006) shows low-flow purging of MW-2 was prolonged due to excessive turbidity. This purging pulls contaminated particles into MW-2. The reported dieldrin at the soil sample at ESI-04 is upgradient of both MW-2 and MW-3 and should be investigated further to determine if there is a relationship between these detections.

In summary, the observed exceedances from this investigation are most likely the results of a local use and/or isolated spills into the environment. The physical properties of the compounds exceeding MDEQ standards (DDT and Dieldrin) are such that they both bind tightly to soil; have low mobility and solubility and tend to remain close to the location of the release. Since there is no documented use of DDT and Aldrin (source of the dieldrin) at APHIS, the additional investigative activities discussed above may provide an indication of the source for these contaminants.

If you have any questions regarding the information presented in this document, please contact me by phone at (850) 385-9899, or via e-mail at Robert.Fisher@ttnus.com

Sincerely,

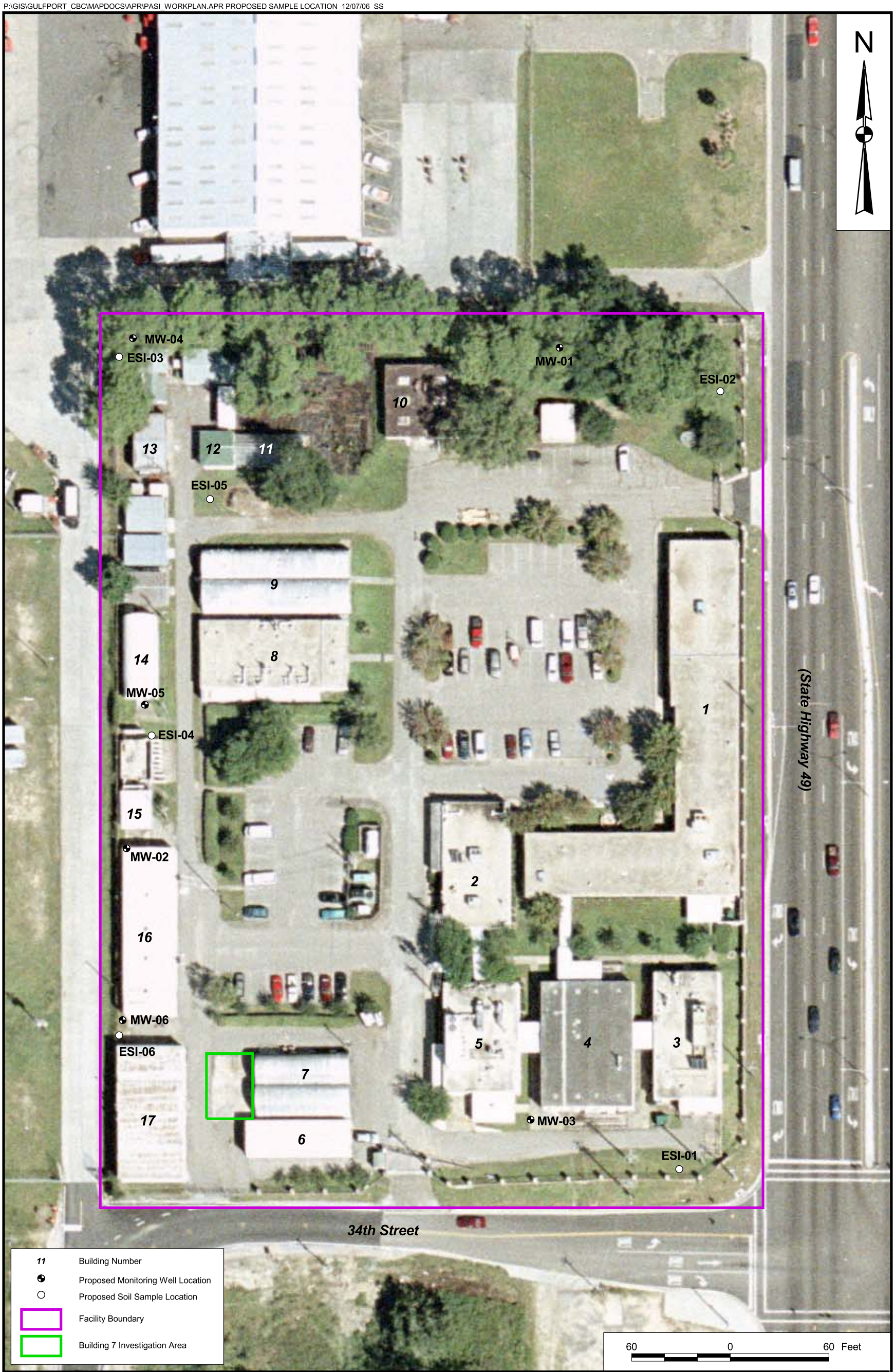


Robert Fisher, P.G.
Task Order Manager

Enclosures

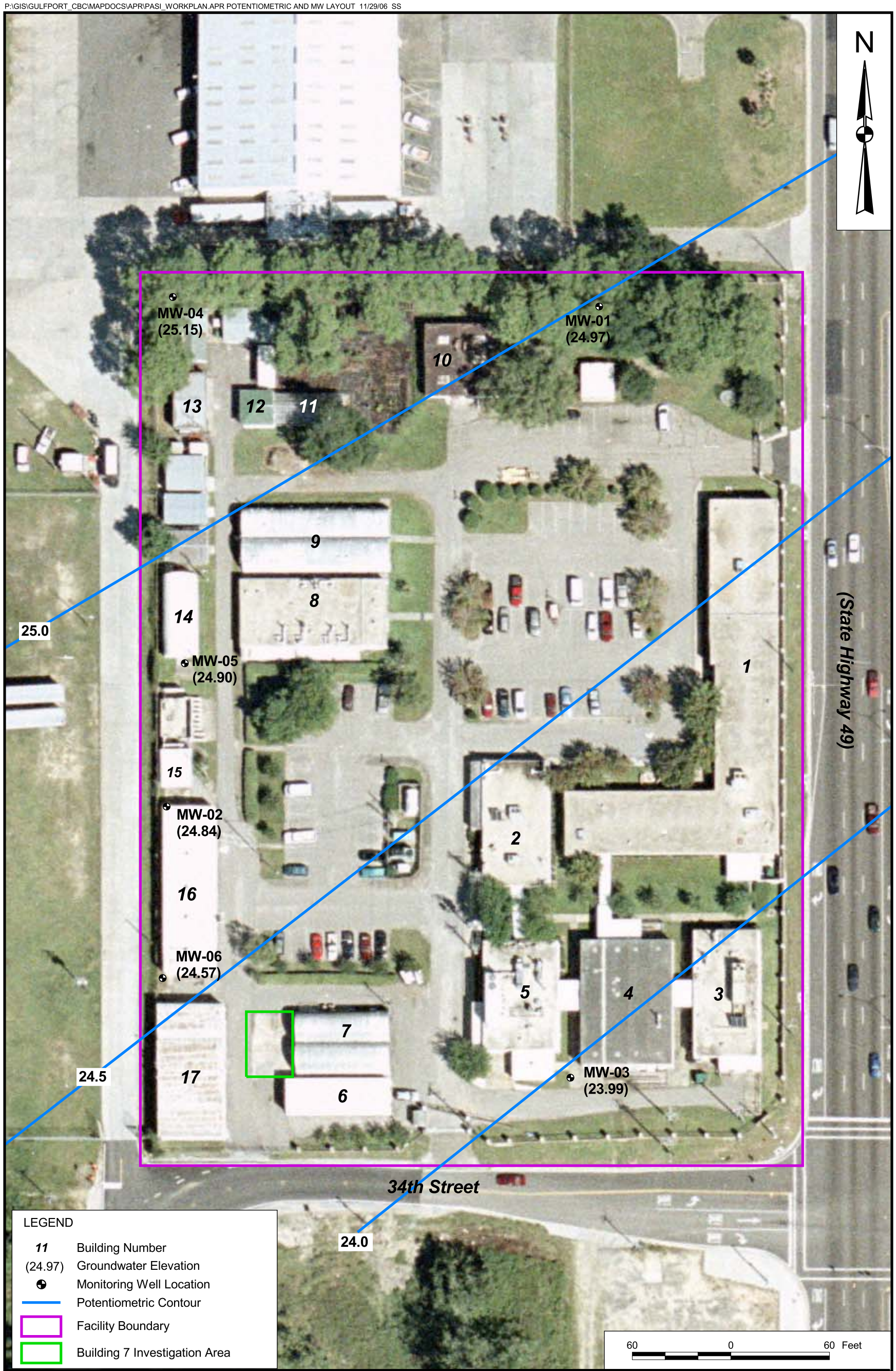
c: Harold McGill, NAVFAC SE (two copies)
Lori P. Miller, USDA (one copy)
Kenny Peterman, USDA APHIS (one copy)
Robert Smith, USDA APHIS (one copy)
Debbie Humbert (Cover Letter Only)
Mark Perry/File (Unbound)

P:\GIS\GULFPORT_CBC\MAPDOCS\APR\PASI_WORKPLAN.APR PROPOSED SAMPLE LOCATION 12/07/06 SS



DRAWN BY A. JANOCHA	DATE 12/18/03	SAMPLE LOCATION MAP USDA APHIS GULFPORT, MISSISSIPPI	CONTRACT NUMBER N0293 CTO 012
CHECKED BY J. BOURGEOIS	DATE 12/07/06		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 1 REV 0

P:\GIS\GULFPORT_CBC\MAPDOCS\APR\PASI_WORKPLAN.APR POTENTIOMETRIC AND MW LAYOUT 11/29/06 SS



DRAWN BY S. STROZ	DATE 5/12/06	POTENTIOMETRIC SURFACE MAP USDA APHIS GULFPORT, MISSISSIPPI	CONTRACT NUMBER N0293 CTO 012
CHECKED BY J. BOURGEOIS	DATE 11/29/06		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 3 REV 0

P:\GIS\GULFPORT_CBC\MAPDOCS\APR\PASI_WORKPLAN.APR MDEQ TIER I TRGS LAYOUT 12/07/06 SS

DRAWN BY	DATE
K. PEILA	1/27/05
CHECKED BY	DATE
J. BOURGEOIS	12/07/06
COST/SCHEDULE-AREA	
SCALE	
AS NOTED	

NAVFAC

GROUNDWATER EXCEEDANCES
ROUND 2
USDA APHIS FACILITY
GULFPORT, MISSISSIPPI

CONTRACT NUMBER	
CTO 0012	
APPROVED BY	DATE
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DRAWING NO.	REV
FIGURE 4	0

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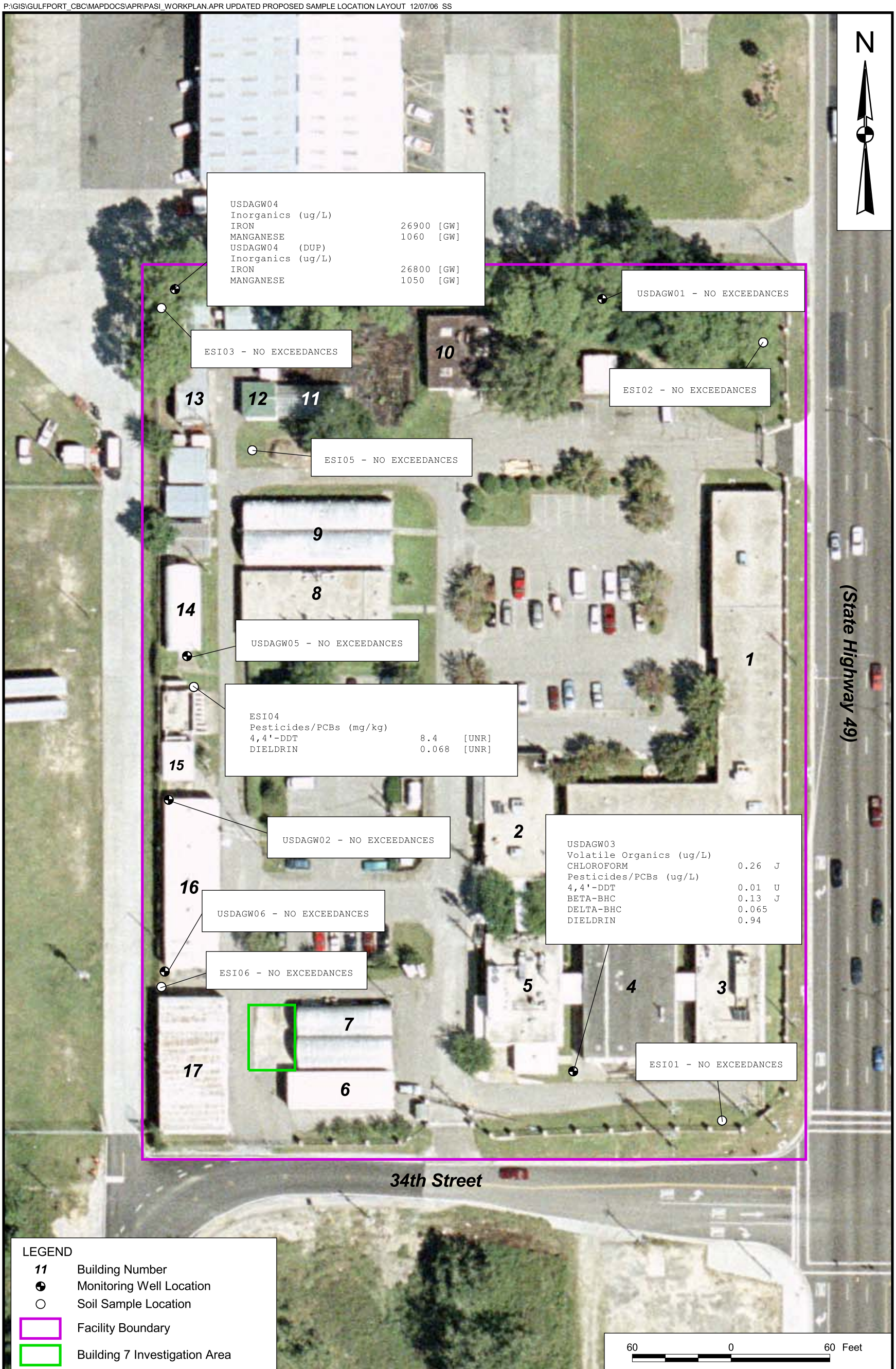

DRAWN BY S. STROZ	DATE 5/12/06	SOIL AND GROUNDWATER EXCEEDANCES ROUND 1 USDA APHIS FACILITY GULFPORT, MISSISSIPPI	CONTRACT NUMBER N0293 CTO 012
CHECKED BY J. BOURGEOIS	DATE 12/07/06		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 2 REV 0