# DRAFT SITE INSPECTION
# TECHNICAL MEMORANDUM
# Sites 1 and 4

**174th Fighter Wing**
**Hancock Air National Guard Base**
**Syracuse, New York**

**Air National Guard**
**3500 Fetchet Avenue**
**Andrews A.F.B., Maryland**

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# Executive Summary

The Hancock Air National Guard (ANG) Base is located in Syracuse, New York immediately south of and adjacent to the Syracuse International Airport (Hancock Field). The ANG Base consists of several buildings and operational facilities separated into three main tracts of land (Tracts I, II, and III). Previous environmental investigations were conducted under the Installation Restoration Program (IRP) at the ANG Base and five specific sites (Site 1, Site 4, Site 9, Site 11, and Site AOC-P) were identified as potential areas of concern. The previous environmental investigations included a Phase 1 investigation conducted in 1982, Phase 2 investigations conducted in 1984 and 1989, and a Site Assessment (SA) investigation conducted in 1999. Aneptek Corp. conducted a SA investigation and report in 2003. In 2004, CH2M HILL conducted additional Site Inspection (SI) activities at IRP Sites 1, 4, 9, 11, and AOC-P.

The SI Report for IRP Sites 1, 4, 9, 11, and AOC-P recommended no additional activities for Sites 9, 11, and AOC-P, and limited additional investigations for Sites 1 and 4. A letter prepared on August 24, 2004 by the NYSDEC provided concurrence with the Site Inspection Report recommendations. The additional activities at Sites 1 and 4 were recommended to complete delineation at these sites. Specifically, these additional activities include the installation of an additional monitoring well at Site 4, the collection of surface and subsurface soil samples from the new monitoring well location, and the collection of groundwater samples from the new and existing monitoring wells at Site 4 and from the existing monitoring wells at Site 1.

In the surface and subsurface soil samples collected, three SVOCs [benzo(a)anthracene, benzo(a)pyrene, and chrysene] were detected above NYSDEC Recommended Soil Cleanup Objective criteria. These detections are consistent with SVOC detections in soil associated with the Site 4 area. However, SVOC were not detected in groundwater at Site 4 above the NYSDEC Drinking Water Quality Standard (DWQS) values. In addition, there were no exceedances of VOCs in the collected Site 4 groundwater samples. Therefore, SVOC exceedances in soils are insufficient to impact groundwater, and no further action is recommended at Site 4.

Aluminum, iron, manganese, nickel, and sodium were found in dissolved groundwater samples from Site 1 at concentrations that exceed the NYSDEC DWQS. These exceedances are similar to those detected in January 2004, indicating that metals concentrations at Site 1 are stable. A review of the distribution of the dissolved metals detected, the aluminum, iron, nickel, and sodium concentrations that exceed the NYSDEC DWQS were found in upgradient or side-gradient monitoring wells and are not related to the Site 1 activities. However, the manganese concentrations that exceed the NYSDEC DWQS are found in the monitoring well immediately adjacent to the suspected Site 1 source area and in the monitoring well hydraulically downgradient from the source area. Since the manganese concentrations in groundwater appear stable between the January 2004 and December 2006 sampling events, there is apparently little migration potential to further downgradient areas. No additional Site Inspection activities are recommended at Site 1.

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# Acronyms and Abbreviations

| | |
|---|---|
| ANG | Air National Guard |
| DoD | Department of Defense |
| DWQS | Drinking Water Quality Standards |
| IRP | Installation Restoration Program |
| NAVD | North American Vertical Datum |
| NYSDEC | New York State Department of Environmental Conservation |
| PID | Photoionization Detector |
| QAPP | Quality Assurance Project Plan |
| RSCO | Recommended Soil Cleanup Objective |
| SA | Site Assessment |
| SI | Site Inspection |
| SVOC | Semi-Volatile Organic Compound |
| USEPA | United States Environmental Protection Agency |
| VOC | Volatile Organic Compound |

# 1.0 Introduction

The Defense Environmental Restoration Program was established in 1984 to promote and coordinate efforts for the evaluation and cleanup of contamination at Department of Defense (DoD) installations. The program currently includes the Installation Restoration Program (IRP), through which potential contamination at DoD installations and formerly owned or used properties are investigated and, as necessary, site cleanups are conducted. The Air National Guard (ANG), through ANG Headquarters, conducts that portion of the IRP that is applicable to ANG units and facilities.

The Hancock ANG Base is located in Syracuse, NY immediately south of and adjacent to the Syracuse International Airport (Hancock Field). The ANG Base consists of several buildings and operational facilities separated into three main tracts of land (Tracts I, II, and III) (Figure 1). Previous environmental investigations were conducted under the IRP at the ANG Base and five specific sites (Site 1, Site 4, Site 9, Site 11, and Site AOC-P) were identified as potential areas of concern. The previous environmental investigations included a Phase 1 investigation conducted in 1982, Phase 2 investigations conducted in 1984 and 1989, and a Site Assessment (SA) investigation conducted in 1999. Aneptek Corp. completed the SA investigation and report in 2003 (Aneptek, 2003). In 2004, CH2M HILL conducted additional Site Inspection (SI) activities at IRP Sites 1, 4, 9, 11, and AOC-P.

The Site Inspection Report for IRP Sites 1, 4, 9, 11, and AOC-P (CH2M HILL, 2004) recommended no additional activities for Sites 9, 11, and AOC-P, and limited additional investigations for Sites 1 and 4. A letter prepared on August 24, 2004 by the New York State Department of Environmental Conservation (NYSDEC) provided concurrence with the Site Inspection Report recommendations. The additional activities at Sites 1 and 4 were recommended to complete delineation at these sites. Specifically, these additional activities include the installation of an additional monitoring well at Site 4, and the collection of groundwater samples from the new and existing monitoring wells at Site 4 and from the existing monitoring wells at Site 1.

CH2M HILL developed a Scope of Work, under ANG Contract Number DAHA 92-01-D-009, to complete site delineation of IRP Sites 1 and 4 as required by the NYSDEC, and submitted a Site Inspection Addendum #1, Work Plan Addendum to the ANG and NYSDEC in November 2006. The Work Plan was implemented after receiving NYSDEC approval. The purposes of this Technical Memorandum are to describe the activities conducted during the SI addendum, present the analytical results from the SI addendum activities, compare these results with historical data, and assess if delineation has been completed at Sites 1 and 4.

## 1.1 Site Geology

A simple layer-cake stratigraphy is found beneath the site with unconsolidated lacustrine (former lake) sediments overlying glacial till sediments overlying sedimentary bedrock. The lacustrine sediment occur from near the surface to depths of about 50 ft below grade and are

composed of silts with varying amounts of clay and fine to medium sand. The glacial till sediments are about 30 to 50 ft thick and consist of large cobbles and gravel in a silty clay matrix. This glacial till unit acts as a confining unit for the groundwater in the underlying sedimentary bedrock. The sedimentary bedrock is composed of shales and siltstones of the Vernon Formation.

An unconfined water table aquifer occurs in the lacustrine sediments at depth of 5 to 10 feet across the site, although the low transmissivity of the aquifer precludes it as a viable potable water source. Existing overburden monitoring wells are screened across the first-encountered groundwater table to assess the potential of floating product in the groundwater. A confined aquifer occurs in the bedrock below the glacial till aquitard. Existing bedrock monitoring wells indicate that there is a strong upward flow potential between the confined bedrock aquifer and the unconfined water table aquifer. This strong upward flow potential indicates that potential site-related contaminants would be limited to the water table aquifer.

## 1.2 Site Descriptions

### 1.2.1 Site 1 – Former Fire Training Area, Tract III

Site 1 (FT001 Fire Training Area) (Figure 2) encompasses an area of about 0.75 acres and is located approximately 250 feet northwest of the intersection of Avenue D and Thompson Road. The site is located on top of an abandoned concrete aircraft parking area, and was used from 1948 to 1985 for fire training exercises where waste fuels such as fuel oils, jet fuel, etc. were used as accelerants.

During the 2004 site investigation, CH2M HILL advanced soil borings, installed one monitoring well (MW-1A), and collected soil and groundwater samples from Site 1. There are currently six monitoring wells at Site 1, consisting of five shallow water table monitoring wells, and one bedrock monitoring well.

#### Site 1 Conceptual Site Model

The use and disposal of flammable liquids resulted in potential environmental impacts at Site 1. Unburned liquid and residuals represent the majority of the potential contaminants and these may have migrated from the concrete pad surface to the surface and subsurface soils along the outside of the concrete pad. Once in the soil, these contaminants would either adhere to soil particles, migrate further down into the soil column, leach to groundwater, or vaporize into the soil gas based on their chemical-specific properties and the properties of the soil. Dissolved contaminants in groundwater would flow vertically and horizontally based on the groundwater flow conditions and natural dispersion.

Overburden groundwater flow at Site 1 is to the southeast under a hydraulic gradient of about 0.007 ft/ft. Based data gathered during previous investigations, exceedances of volatile organic compounds (VOCs) (xylene and toluene) and semivolatile organic compounds (SVOCs) (phenol and benzo(a)pyrene) in soil are limited in nature and extent to the area immediately adjacent to the concrete pad, and have not impacted the groundwater at the site (CH2M HILL, 2004). The SVOCs benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and dibenzo(a,h)anthracene were

detected at concentrations above the recommended soil cleanup objective (RSCO) in the shallow (0 to 2 inch depth) soil samples collected in 2004, and, as these compounds are also found in the shallow background soil samples, these detections may represent a background condition at the ANG Base. Aluminum, iron, magnesium, manganese, nickel, and sodium were found to exceed the applied standards for both the soil and groundwater samples collected in 2004. The exceedances of aluminum, magnesium, manganese, nickel, and sodium in groundwater are from monitoring well MW-1A located near the concrete pad and in the hydraulically downgradient wells MW-12 and MW-13.

### 1.2.2 Site 4 – D5 Disposal Site, Tract III

Site 4 (DP004 Disposal Site) (Figure 3) is an unlined disposal area located approximately 250 feet north of Avenue D. The site surrounds an old concrete aircraft hardstand (parking area) that extends north from Avenue D. The disposal area was approximately 100 feet by 150 feet wide, and was used from 1950 to 1976 to dispose of construction debris, empty ammunition boxes, sod, empty drums, and possibly a few drums that contained hazardous wastes (paints, thinners, and solvents) generated by shops at the installation. After 1976, the aircraft hardstand was used by the ANG as an engine test pad. During the 2004 site investigation, CH2M HILL advanced soil borings, installed two monitoring wells (MW-4A and MW-4B), excavated three trenches, and collected soil and groundwater samples from Site 4. There are currently five existing and one newly installed shallow water table monitoring wells at Site 4.

#### Site 4 Conceptual Site Model

The disposal of construction debris, empty ammunition boxes, sod, and drums may have resulted in environmental impacts at Site 4. Since these items were buried in unlined pits, water from precipitation would migrate downward through the disposal area, potentially leaching metals and residual liquids further into the soil column. Once in the soil, these contaminants would adhere to soil particles, migrate further down into the soil column, leach to groundwater, or may vaporize into the soil gas based on their chemical-specific properties and the properties of the soil. Dissolved contaminants in groundwater would flow vertically and horizontally based on the groundwater flow conditions and natural dispersion.

Overburden groundwater flow at Site 4 is to the northeast-east under a hydraulic gradient of about 0.007 ft/ft. The presence of buried debris at Site 4 was confirmed in 2004 during the course of investigation activities. Three test pits, designated as TP-4A, TP-4B, and TP-4C, were excavated to assess the source of the geophysical anomalies (Figure 3). Each test pit was excavated using a conventional backhoe which removed the soil in 6-inch to 1-foot lifts. The completed test pits were about 20 feet long, 3 feet wide, and six feet deep. During the excavation of test pit TP-4A, various automotive parts and other debris were uncovered including a muffler, rubber hoses, copper tubing, concrete, 55-gallon drum lid, and unidentified debris. Excavation TP-4B revealed similar debris including an empty 55-gallon drum. Test pit TP-4C contained automotive metallic and other debris including wires, a wet cell battery, bumper, tailpipe, and asphalt. Soil samples collected during this time had concentrations of VOCs below the applicable NYSDEC RSCO standard. Several SVOCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and dibenzo(a,h)anthracene, dimethylphthalate, indeno(1,2,3-cd) pyrene, phenol,

and pyrene) were detected in the shallow (0.5-feet below grade) and deeper (5.0 feet below grade) soil samples at concentrations above the RSCO Standards (CH2M HILL, 2004). These SVOC exceedances in soil are likely related to the debris that was found in the test pits. The SVOCs detected in groundwater were below the applicable standard and therefore the SVOC exceedances in the soils are insufficient to impact groundwater. Two metals (iron and manganese) were found to exceed the established standards for both soil and groundwater samples. It is noted that the iron and manganese exceedances in groundwater are from the upgradient monitoring well MW-18, suggesting that these metals may not be related to the buried metals at the site.

# 2.0 Site Investigation Activities

CH2M HILL implemented site investigation activities identified in the Work Plan Addendum (November 2006) with the support of ANG personnel, and various subcontractors. ANG personnel assisted with underground utility clearance, security clearance, facilitating communications at the ANG Base, providing access to the sites, and other logistical issues. Parratt Wolfe of East Syracuse, New York provided the subsurface drilling crew. RJ Rybinski, LS of Manlius, New York conducted the surveying of the sample locations and monitoring well elevations, and STL Laboratories of Edison, New Jersey provided the analytical laboratory services. The activities described below were conducted in accordance with the NYSDEC-approved Site Inspection Addendum #1, Final Work Plan Addendum (November 29, 2006), including decontamination between sampling locations and sampling intervals, management of the investigation derived waste, adherence to the site-specific health and safety plan, and implementation of the quality assurance project plan.

## 2.1 Site 1

Synoptic water level measurements were recorded and groundwater samples were collected from the five existing monitoring wells (MW-1A, MW-09, MW-11, MW-12, and MW-13). Together, these wells form an effective monitoring network around Site 1 to assess the groundwater quality related to historic site activities. A groundwater sample was not collected from deeper monitoring well MW-13D based on the strong upward hydraulic gradient (near artesian conditions) noted in the SA Report (Aneptek, 2003) that would limit the potential downward vertical migration of groundwater at the site. As detailed in the NYSDEC-approved Work Plan (November 29, 2006), groundwater samples were collected from monitoring wells MW-1A, MW-09, MW-12, and MW-13 using the United States Environmental Protection Agency (USEPA) low flow method with 2-inch-diameter Grundfos pump and dedicated Teflon-lined polyethylene tubing. Due to the presence of an obstruction (see Section 2.3) USEPA low flow sampling was performed using a peristaltic pump for monitoring well MW-11 to collect samples for metals analysis. The low-flow sampling method was used during this investigation to minimize the sample turbidity. Total and dissolved groundwater samples were collected from each monitoring well. Groundwater samples collected for dissolved metals were filtered in the field using a 0.45 micron in-line filter prior to metals analysis. The groundwater samples were collected in labeled containers, placed in an ice-filled cooler, and submitted for laboratory analysis of total (unfiltered) and dissolved (filtered) metals (EPA Method 6010B).

## 2.2 Site 4

Field activities at Site 4 included the installation of one monitoring well (MW-4C), collection of one surface soil sample, collecting synoptic water elevation measurements, and sampling existing and newly installed monitoring wells.

Prior to advancing the boring for monitoring well MW-4C, a surface soil sample was collected at this location. This sample was collected at a depth of 0.5-feet below grade due to a shallow water table (less than one foot below grade). The soil sample was submitted to a NY-licensed laboratory for analysis of VOCs and SVOCs.

One groundwater monitoring well, MW-4C, was installed at Site 4, northeast of the geophysical survey area (Figure 3), to complete the groundwater monitoring network for this area. This monitoring well was completed in accordance with SOP C.6 of the December 2003 NYSDEC-approved Site Inspection Work Plan for Sites 1, 4, 9, 11, and AOC-P.

Monitoring well MW-4C (Figure 3) was installed by advancing a nominal 6-inch diameter boring to 14-feet below grade using hollow-stem auger methods. Soil samples were collected continuously every two feet using split-barrel samplers, and were logged for lithologic purposes. In addition, the soil samples were screened using a photoionization detector (PID) to assess the presence of VOCs. After reaching the target depth, a monitoring well, consisting of 2 inch diameter PVC materials with a 10 foot section of 0.010-inch slotted well screen, was placed into the borehole. A sand filter pack was installed around the monitoring well screen from the bottom of the borehole to about 2 feet above the top of the well screen. A bentonite-grout seal was then placed on top of the filter pack. The monitoring well was completed with a stick-up outer-protective casing with a concrete pad and locking cap. Excess drill cuttings were spread on the ground adjacent to the drilling location as approved by the NYSDEC. A well construction diagram is included in Appendix A.

After installation, MW-4C was developed in accordance with SOP C.6 of the December 2003 NYSDEC-approved Site Inspection Work Plan for Sites 1, 4, 9, 11, and AOC-P. Development consisted of purging the well using a submersible pump and continued until the well yield consisted of relatively sediment-free water. Development purge water was allowed to infiltrate into the ground adjacent to the monitoring well location.

A NY-licensed surveyor surveyed the location and elevation of the MW-4C in accordance with SOP C.11. The location of the monitoring well was established within 0.1 ft and the casing elevation was established within 0.01 ft of the North American Vertical Datum (NAVD) 1988.

Synoptic water level measurements were recorded and groundwater samples were collected from four existing monitoring wells (MW-4A, MW-4B, MW-17, and MW-18), and one newly installed monitoring well MW-4C. Monitoring well MW-16 was not sampled since it was inaccessible at the time of the December 2006 site inspection (see Section 2.3).

As detailed in the NYSDEC-approved Work Plan (November 2006), groundwater samples were collected from MW-4A, MW-4B, and MW-4C using the USEPA low flow method with 2-inch-diameter Grundfos pump and dedicated Teflon-lined polyethylene tubing. Due to the presence of an obstruction (see Section 2.3), monitoring wells MW-17 and MW-18 were sampled using dedicated Teflon bailers. The groundwater samples were collected in labeled containers, placed in an ice-filled cooler, and submitted for laboratory analysis of VOCs and SVOCs using EPA Method 8260B and 8270C, respectively.

## 2.3 Deviations

Low-flow groundwater sampling using a 2-inch diameter Grundfos pump was not possible in monitoring wells MW-11, MW-17, and MW-18, due to the fact that the well casings were damaged. Evidence of construction activity was observed in the general vicinity of these monitoring wells, as large vehicle tracks were present on the ground around the concrete well pads. Monitoring well MW-11, at Site 1, was sampled for metals using a peristaltic pump and Teflon-lined polyethylene tubing for the purpose of collecting a low turbidity groundwater sample. Monitoring wells MW-17 and MW-18, at Site 4 were sampled for VOCs and SVOCs using a dedicated Teflon bailer.

In addition, monitoring well MW-16 was inaccessible since the outer casing cap was pinched into the outer casing, and could not be safely removed. As mentioned above, construction equipment was parked in the vicinity of this monitoring well, and there was evidence of construction vehicle traffic directly adjacent to MW-16.

# 3.0 Site Investigation Results and Conclusions

## 3.1 Analytical Results

A data validation effort was completed on the analytical data set received from the laboratory. The data validation effort was conducted in accordance with the Quality Assurance Project Plan (QAPP) (December 2003) and included a review of the data accuracy, precision, and completeness. A data validation memorandum (Appendix B) summarizes the data qualifiers added to the data and concludes that the data are of good quality and are acceptable as reported and qualified. Appendix C contains summary tables of the validated data set. The soil results for metals were compared to an established background standard (as described in the September 2004 Final Technical Memorandum for Sites 1, 4, 9, 11, and AOC-P). The VOC and SVOC analyses were compared to the NYSDEC Recommended Soil Cleanup Objective (RSCO). Groundwater results were compared to the NYSDEC Drinking Water Quality Standards (DWQS).

## 3.2 Hydrogeological Characterization

Depths to groundwater (DTW) measurements of the water table monitoring wells were collected at Sites 1 and 4 on December 12, 2006. These data are presented below in Table 1 along with groundwater elevation measurements collected during the previous SI investigation at these sites on February 3, 2004. The water level elevations in the monitoring wells were calculated by subtracting the DTW measurement from the well casing elevation.

TABLE 1
Depth to Groundwater Measurements
*174th Fighter Wing, Hancock Air National Guard Base, Syracuse, New York*

| | | February 3, 2004 | | December 12, 2006 | |
|---|---|---|---|---|---|
| **Monitoring Well** | **Well Casing Elevation (feet AMSL)** | **Depth to Groundwater (ft)** | **Water Level Elevation (feet AMSL)** | **Depth to Groundwater (ft)** | **Water Level Elevation (feet AMSL)** |
| | | **Site 1 Monitoring Wells** | | | |
| MW-1A | 400.37 | 11.58 | 388.79 | 8.86 | 391.51 |
| MW-09 | 397.63 | 8.41 | 389.22 | 6.25 | 391.38 |
| MW-11 | 400.10 | 10.25 | 389.85 | 6.97 | 393.13 |
| MW-12 | 398.89 | 11.13 | 387.76 | 8.74 | 390.15 |
| MW-13 | 398.77 | 11.61 | 387.16 | 8.94 | 389.83 |

TABLE 1
Depth to Groundwater Measurements
*174th Fighter Wing, Hancock Air National Guard Base, Syracuse, New York*

| | | February 3, 2004 | | December 12, 2006 | |
|---|---|---|---|---|---|
| **Monitoring Well** | **Well Casing Elevation (feet AMSL)** | **Depth to Groundwater (ft)** | **Water Level Elevation (feet AMSL)** | **Depth to Groundwater (ft)** | **Water Level Elevation (feet AMSL)** |
| | | **Site 4 Monitoring Wells** | | | |
| MW-4A | 396.53 | 3.87 | 392.66 | 3.76 | 392.77 |
| MW-4B | 396.49 | 3.55 | 392.94 | 3.34 | 393.15 |
| MW-4C | 394.76 | NM | NM | 2.29 | 392.47 |
| MW-16 | 398.79 | 5.42 | 393.37 | NM | NM |
| MW-17 | 398.19 | 5.46 | 392.73 | 4.89 | 393.3 |
| MW-18 | 398.16 | 4.74 | 393.42 | 4.32 | 393.84 |

NM – Not Measured

AMSL – Above mean sea level

Groundwater elevations from December 12, 2006 were contoured on Figures 4, 5, and 6, for Site 1, Site 4, and the overall ANG Base, respectively. Groundwater flow at Site 1 (Figure 4) is to the southeast under a hydraulic gradient of about 0.007 ft/ft. At Site 4 (Figure 5), the groundwater flow direction is to the northeast-east under a hydraulic gradient of about 0.007 ft/ft. Groundwater flow of the water table aquifer across Sites 1 and 4 (Figure 6) is generally to the east under an apparent hydraulic gradient of about 0.003 ft/ft. The groundwater flow direction and hydraulic gradient at Sites 1 and 4 are consistent with those measured in January 2004.

## 3.3 Site 1 – Groundwater

A summary of the analytical detections in groundwater are presented on Tables 2 and 3 for total (unfiltered) metals and dissolved (filtered) metals, respectively.

The groundwater sampling method employed during the January 2004 and December 2006 SI at Site 1 was focused on reducing the turbidity of the samples submitted for total metals (unfiltered) using low-flow sampling methods. Also, filtered samples were collected during the sampling event to further assess the dissolved fraction of metals in groundwater. During the previous SA investigation (Aneptek, 2003), groundwater samples to be analyzed for total metals were collected using a bailer, which tends to increase the amount of turbidity in the sample. The total metals (unfiltered) results are summarized in Table 2. The analytical results from the January 2004 and December 2006 sampling events at Site 1 demonstrate that the low-flow sampling method effectively reduced the metals concentrations in the unfiltered groundwater samples, suggesting that particles in the groundwater samples are likely resulting in the number of metals exceeding the groundwater quality standard. As such, the nine metals that exceed the groundwater

quality standard (aluminum, chromium, cobalt, copper, iron, magnesium, manganese, nickel, and sodium) are not likely representative of the dissolved metals that could potentially migrate in the groundwater.

Five metals exceeded the NYSDEC DWQS in the dissolved (filtered) groundwater samples collected from Site 1 monitoring wells (Table 3), and these are aluminum and iron in monitoring well MW-09, manganese in monitoring wells MW-1A and MW-12, nickel in monitoring well MW-13, and sodium in monitoring wells MW-12 and MW-13. The distribution of the wells where dissolved metal concentrations exceed the NYSDEC DWQS provides an understanding of the potential sources.

### Aluminum and Iron

Monitoring well MW-09 is located about 350 ft north (side-gradient) of the former fire training pad area and the aluminum and iron are likely related to naturally occurring metals in the soils and not from activities associated with fire training.

### Manganese

Monitoring wells MW-1A and MW-12 are located adjacent to and immediately downgradient from the suspected source area, respectively. The dissolved manganese concentrations in these wells (1,510 µg/L for MW-1A and 400 µg/L for MW-12) are consistent with the January 2004 groundwater sampling results, which suggests that these concentrations are stable. The distribution of the dissolved manganese groundwater concentrations suggest that they may be associated with the previous fire training activities, with the highest concentration detected in the adjacent well (MW-1A) and the concentration decreases to near the NYSDEC DWQS (300 µg/L) in the downgradient well (MW-12). The stability of the dissolved manganese concentration from January 2004 to December 2006 indicates that additional manganese is not being introduced into the groundwater (i.e., no on-going manganese soil source) and that the migration potential of manganese is limited.

### Nickel

Nickel was detected in monitoring well MW-13 at a concentration of 251 µg/L, which exceeds the NYSDEC DWQS of 100 µg/L. The concentration of nickel in this monitoring well decreased from the previous sampling event (652 µg/L in January 2004). As nickel was not detected at concentrations above the NYSDEC DWQS in January 2004 or December 2006 in the monitoring well immediately adjacent to the suspected source area, the nickel is not considered to be related to the former fire training activities.

### Sodium

Exceedances of sodium were detected in monitoring wells MW-12 and MW-13 at concentrations of 53,000 µg/L and 76,600 µg/L, respectively. These two monitoring wells are located along side a road that is treated with salt to assist in melting snow during the winter months. The elevated concentrations of sodium are most likely the result of these winter salt treatments.

Overall, the results confirm the conclusions of the January 2004 Site Inspection Technical Memorandum (CH2M HILL, 2004), which state that metals concentrations at Site 1 are stable. Further, the land occupying Site 1 and surrounding area is to be used for

military/industrial purposes indefinitely, and there are no known or planned uses of groundwater from this area. Based on this information, no further action for Site 1 is needed.

## 3.4 Site 4 – Soil

A summary of the analytical detections in the soil sample collected at Site 4 are presented on Tables 4 and 5 for VOC and SVOC analysis, respectively. No VOCs were detected above NYSDEC RSCO criteria in the soil sample collected from Site 4 (Table 4). SVOCs, specifically benzo(a)anthracene, benzo(a)pyrene, and chrysene, were detected in the shallow soil sample at concentrations above the RSCO Standards (Table 5). However, these compounds were detected at similar concentrations in the background soil samples collected for the SI Report (CH2M HILL, 2004) and are considered to be associated with the background conditions.

## 3.5 Site 4 – Groundwater

A summary of the analytical detections in groundwater are presented on Tables 6 and 7 for VOCs and SVOCs, respectively.

A review of Table 6 and 7 indicates there were no exceedances of the NYSDEC DWQS by VOCs or SVOCs detected in groundwater at Site 4. A groundwater sample was not collected from monitoring well MW-16 since this well was inaccessible during the December 2006 SI. MW-16 has historically been the upgradient monitoring well at Site 4, and has not historically exhibited concentrations of VOCs and SVOCs in exceedance of the NYSDEC DWQS.

It is noted that the SVOCs detected in the soil samples above NYSDEC RSCO criteria were not detected in the groundwater samples collected from Site 4. Therefore, the SVOC exceedance in soils does not represent a source to groundwater at Site 4.

# 4.0 Recommendations

## 4.1 Site 1

Overall, the results confirm the conclusions of the January 2004 Site Inspection Technical Memorandum (CH2M HILL, 2004), which state that metals concentrations at Site 1 are stable. Further, the land occupying Site 1 and surrounding area is to be used for military/industrial purposes indefinitely, and there are no known or planned uses of groundwater from this area. Based on this information, no further action for Site 1 is recommended.

## 4.2 Site 4

Since VOCs and SVOCs were not detected groundwater samples at Site 4 and concentrations of SVOCs in soil are insufficient to impact groundwater, no further action is recommended at Site 4.

# 5.0 References

Aneptek Corporation. 2003. Final Site Assessment Report Site 1, Site 4, Site 9, Site 10, Site 11, AOC 1-3. 174th Fighter Wing New York Air National Guard, Hancock Air National Guard Base, Syracuse, New York. February 2003.

CH2M HILL. 2004, Site Inspection Technical Memorandum, Syracuse, New York, Air National Guard. September 2004.

CH2M HILL. 2006. CH2M HILL Proposal for Site Inspection – Addendum #1 at Sites 1 and 4. Environmental Restoration Program Services. August 2006.

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# Tables

TABLE 2
Summary of Total Metals Detected in Groundwater
Site 1 - Monitoring Wells
*Air National Guard - Hancock Field Syracuse, NY*

| Monitoring Well Number | | Aluminum | Antimony | Arsenic | Barium | Beryllium | Cadmium | Calcium | Chromium | Cobalt | Copper | Iron | Lead | Magnesium | Manganese | Mercury | Nickel | Potassium | Silver | Sodium | Thallium | Vanadium | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Standard*** | | **100** | **3** | **50** | **1000** | **11** | **5** | **NS** | **50** | **50** | **200** | **300** | **50** | **35000** | **300** | **0.7** | **100** | **NS** | **50** | **20000** | **NS** | **NS** | **NS** |
| **Previous SA Report** | **MW-09** | 16000 | 3U | 6 | 300U | 3U | 5 | 160000 | 50U | 60 | 40 | 25000 | 9 | 43000 | 600 | 0.4U | 100 | 6800 | 50U | 6600 | 3U | 300U | 60 |
| | **MW-11** | 79000 | 3U | 25 | 500 | 8 | 37 | 800000 | 180 | 440 | 250 | 140000 | 450 | 270000 | 4500 | 0.5 | 290 | 17000 | 50U | 8300 | 31 | 300U | 400 |
| | **MW-12** | 120000 | 3U | 24 | 600 | 10 | 52 | 890000 | 250 | 760 | 380 | 220000 | 60 | 300000 | 9200 | 0.5 | 430 | 16000 | 90 | 9000 | 41 | 300U | 670 |
| | **MW-13** | 18000 | 3U | 6 | 300U | 3U | 9 | 200000 | 130 | 90 | 50 | 28000 | 11 | 65000 | 550 | 0.4U | 180 | 8000 | 50U | 29000 | 3U | 300U | 100 |
| **January 2004 Site 1 Investigation** | **MW-1A** | 18100 | 3.9U | 6 | 203 | 0.77 UB | 0.4U | 270000 | 28.8 | 14.9 B | 41.8 | 30600 | 13.6 | 101000 | 2430 | 0.1U | 39.8 B | 4030 B | 0.7U | 10900 | 4.4U | 32.3 B | 89.3 |
| | **MW-09** | 401 | 3.9U | 3.4U | 31.2 B | 0.1U | 0.4U | 151000 | 2.8U | 3.5U | 2.1U | 2680 | 2.2U | 26700 | 235 | 0.1U | 4.1 B | 387 B | 0.7U | 4990 | 4.4U | 1.5U | 7.9 B |
| | **MW-11** | 55800 | 3.9U | 35.7 | 284 | 2.7 | 0.92 UB | 532000 | 95.7 | 42.4 B | 146 | 107000 | 57.8 | 203000 | 4380 | 0.12 B | 117 | 7030 | 0.7U | 5730 | 4.4U | 97 | 285 |
| | **MW-12** | 59300 | 3.9U | 52.1 | 314 | 2.9 | 1.1 UB | 570000 | 99.3 | 44.8 B | 173 | 142000 | 45.6 | 205000 | 4450 | 0.12 B | 129 | 7010 | 0.7U | 37000 | 4.4U | 105 | 297 |
| | **MW-13** | 20900 | 6.3 B | 14.2 | 180 B | 0.89 UB | 0.4U | 320000 | 21200 | 137 | 277 | 113000 | 18.1 | 116000 | 1880 | 0.1U | 2200 | 3780 B | 0.98 B | 54500 | 4.4U | 107 | 273 |
| **December 2006 Site 1 Investigation** | **MW-1A** | 1440 | 5.8U | 3.2U | 57.8 B | 0.3U | 0.4U | 128000 | 301 | 11.4 B | 18.9 B | 3750 | 2.7U | 26300 | 1530 | 0.1U | 197 | 1960 B | 1.4U | 18000 | 4.7U | 4.7U | 12.1 B |
| | **MW-09** | 3630 | 5.8U | 9.8 | 69.2 B | 0.3U | 0.4U | 174000 | 55 | 4.2 B | 17.9 B | 34600 | 2.7U | 35200 | 400 | 0.1U | 37.6 B | 1920 B | 1.4U | 5690 | 4.7U | 7.6 B | 14.4 B |
| | **MW-11** | 4890 | 5.8U | 3.5 B | 56.4 B | 0.53 B | 0.4U | 140000 | 7.5 B | 2.0 B | 13.8 B | 8230 | 2.7U | 26800 | 194 | 0.1U | 8.7 B | 3510 B | 1.4U | 3370 B | 4.7U | 9.0 B | 32.2 |
| | **MW-12** | 19600 | 5.8U | 12.9 | 131 B | 0.79 B | 0.4U | 214000 | 158 | 13.6 B | 53 | 38500 | 7.7 | 62900 | 1660 | 0.1U | 86.2 | 6990 | 1.4U | 52700 | 4.7U | 34.4 B | 87 |
| | **MW-13** | 1980 | 5.8U | 7.5 | 132 B | 0.3U | 0.4U | 127000 | 26800 | 51.9 | 232 | 118000 | 2.7U | 30800 | 298 | 0.1U | 1860 | 2010 B | 1.4U | 74300 | 4.7U | 103 | 69.4 |

**Units are in µg/L**

B - Compound detected in associated field blank
U - Compound not detected, reporting limit shown
UB - Undetected due to blank contamination
NS - No standard
Standard* - NYSDEC Drinking Water Quality Standard (DWQS)
Exceeds NYSDEC DWQS

TABLE 3
Summary of Dissolved Metals Detected in Groundwater
Site 1 - Monitoring Wells
Air National Guard - Hancock Field Syracuse, NY

| Monitoring Well Number | | Aluminum | Antimony | Arsenic | Barium | Beryllium | Cadmium | Calcium | Chromium | Cobalt | Copper | Iron | Lead | Magnesium | Manganese | Mercury | Nickel | Potassium | Silver | Sodium | Thallium | Vanadium | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Standard | 100 | 3 | 50 | 1000 | 11 | 5 | NS | 50 | 50 | 200 | 300 | 50 | 35000 | 300 | 0.7 | 100 | NS | 50 | 20000 | NS | NS | NS |
| January 2004 Site 1 Investigation | MW-1A | 427 | 3.9U | 3.4U | 118 B | 0.1U | 0.4U | 130000 | 2.8U | 3.5U | 4.1 UB | 625 | 2.2U | 43900 | 1420 | 0.1U | 5.5 B | 1240 B | 0.7U | 11100 | 4.4U | 1.5U | 17.1 B |
| | MW-09 | 77.4U | 3.9U | 3.4U | 31.8 B | 0.1U | 0.4U | 154000 | 2.8U | 3.5U | 2.1U | 982 | 2.2U | 27300 | 233 | 0.1U | 3.9U | 415 B | 0.7U | 5130 | 4.4U | 1.5U | 9.8 B |
| | MW-11 | 77.4U | 3.9U | 3.4U | 33.8 B | 0.1U | 0.4U | 133000 | 2.8U | 3.5U | 2.1U | 39.7U | 2.2U | 29200 | 2.9U | 0.1U | 3.9U | 724 B | 0.7U | 3960 B | 4.4U | 1.5U | 7.4 B |
| | MW-12 | 77.4U | 3.9U | 3.4U | 36.4 B | 0.1U | 0.4U | 158000 | 2.8U | 3.5U | 2.1U | 39.7U | 2.2U | 41600 | 407 | 0.1U | 3.9U | 607 B | 0.7U | 37000 | 4.4U | 1.5U | 6.7 B |
| | MW-13 | 77.4U | 3.9U | 3.4U | 25.5 B | 0.1U | 0.4U | 141000 | 2.8U | 16.2 B | 2.1U | 39.7U | 2.2U | 42600 | 148 | 0.1U | 652 | 428 B | 0.7U | 53300 | 4.4U | 1.5U | 7.0 B |
| December 2006 Site 1 Investigation | MW-1A | 62.6U | 5.8U | 3.2U | 53.1 B | 0.3U | 0.4U | 131000 | 7.5 B | 7.1 B | 7.3 B | 261 | 2.7U | 24300 | 1510 | 0.1U | 26.5 B | 1650 B | 1.4U | 19200 | 4.7U | 4.7U | 18.2 B |
| | MW-09 | 791 | 5.8U | 3.2U | 34.6 B | 0.3U | 0.4U | 163000 | 10.2 | 1.7U | 3.7U | 1090 | 2.7U | 28700 | 260 | 0.1U | 4.3 B | 470 B | 1.4U | 5550 | 4.7U | 4.7U | 14.5 B |
| | MW-11 | 62.6U | 5.8U | 3.2U | 36.3 B | 0.3U | 0.4U | 122000 | 1.6U | 1.7U | 3.7U | 39.2U | 2.7U | 17500 | 2.7 B | 0.1U | 2.4U | 2200 B | 1.4U | 3120 B | 4.7U | 4.7U | 6.7 B |
| | MW-12 | 62.6U | 5.8U | 3.2U | 38.6 B | 0.3U | 0.4U | 147000 | 1.6U | 1.7U | 3.7U | 68.2 B | 2.7U | 30200 | 400 | 0.1U | 2.4U | 1740 B | 1.4U | 53000 | 4.7U | 4.7U | 5.8U |
| | MW-13 | 62.6U | 5.8U | 3.2U | 29.9 B | 0.3U | 0.4U | 115000 | 4.1 B | 6.2 B | 4.3 B | 159 | 2.7U | 27200 | 51.2 | 0.1U | 251 | 1360 B | 1.4U | 76600 | 4.7U | 4.7U | 18.9 B |

**Units are in µg/L**

B - Compound detected in associated field blank
U - Compound not detected, reporting limit shown
UB - Undetected due to blank contamination
NS - No Standard
*Standard - NYSDEC Drinking Water Quality Standard (DWQS)
Exceeds NYSDEC DW(

TABLE 4
Summary of VOCs Detected in Soil
Site 4 Soil Borings
*Air National Guard - Hancock Field*

| Soil Boring Number and Depth | | Acetone | Methylene Chloride | Tetrachloroethene | Toluene | Xylenes (total) |
|---|---|---|---|---|---|---|
| | **Standard*** | **200** | **100** | **1400** | **1500** | **1200** |
| **Previous SA Report** | **SB-01 2-4 ft** | NA | NA | NA | NA | 30U |
| | **SB-01 5-7 ft** | NA | NA | NA | NA | 30U |
| | **SB-02 2-4 ft** | NA | NA | NA | NA | 198 |
| | **SB-02 4-6 ft** | NA | NA | NA | NA | 30U |
| | **SB-02 8-10 ft** | NA | NA | NA | NA | 30U |
| | **SB-03 2-4 ft** | NA | NA | NA | NA | 25U |
| | **SB-03 4-6 ft** | NA | NA | NA | NA | 25U |
| | **SB-04 2-4 ft** | NA | NA | NA | NA | 95 |
| | **SB-04 4-6 ft** | NA | NA | NA | NA | 25U |
| **January 2004 Site 4 Investigation** | **SB-4A 0.15 ft** | 22J | 0.6 UB | 1.1UJ | 5.5UJ | 5.5UJ |
| | **SB-4B 0.15 ft** | 140J | 4UJ | 1.3UJ | 6.6UJ | 6.6UJ |
| | **SB-4B 3 ft** | 33J | 3.7U | 1.2U | 6.2U | 6.2U |
| | **SB-4B 5 ft** | 26 | 0.9 UB | 1.2U | 5.9U | 5.9U |
| | **SB-4C 0.15 ft** | 36J | 4UJ | 1.3UJ | 6.6UJ | 6.6UJ |
| | **SB-4C 3 ft** | 18J | 3.4U | 1.1U | 5.7U | 5.7U |
| | **SB-4C 0.15 ft** | 32J | 3.5UJ | 1.2UJ | 5.9UJ | 5.9UJ |
| | **SB-4D 0.15 ft** | 6R | 3.6U | 1.2U | 6U | 6U |
| | **SB-4D 3 ft** | 34J | 1.0 UB | 1.2UJ | 1.4 J | 6.2UJ |
| | **SB-4D 7 ft** | 19J | 3.5U | 1.2U | 1.1 J | 5.9U |
| | **MW-4A 0.15 ft** | 52J | 3.4UJ | 1.1UJ | 1.1 J | 5.7UJ |
| | **MW-4A 3 ft** | 24J | 1.4 UB | 1.3U | 6.3U | 6.3U |
| | **MW-4A 11 ft** | 29J | 3.6UJ | 1.2UJ | 5.9UJ | 5.9UJ |
| | **MW-4B 0.15 ft** | 60J | 4UJ | 1.4UJ | 1.9 J | 6.8UJ |
| | **MW-4B 3 ft** | 21J | 0.7 UB | 1.1U | 5.7U | 5.7U |
| | **MW-4B 6 ft** | 23J | 2.5 UB | 1.2UJ | 5.9UJ | 5.9UJ |
| | **TP-4A 4 ft - A** | 6.4U | 3.9U | 1.3U | 6.4U | 6.4U |
| | **TP-4A 4 ft - B** | 22 | 8 | 0.6 J | 5.6U | 5.6U |
| | **TP-4A 4 ft - C** | 45 | 8.9 | 1.3U | 6.4U | 6.4U |
| | **TP-4B 4.5 ft - A** | 23 | 12 | 1.1U | 5.7U | 5.7U |
| | **TP-4B 4.5 ft - B** | 37 | 18 | 1.1U | 5.6U | 5.6U |
| | **TP-4B 5 ft - C** | 39 | 12 | 1.1U | 5.6U | 5.6U |
| | **TP-4C 3 ft - A** | 34 | 9.4 | 1.2U | 5.9U | 5.9U |
| | **TP-4C 4 ft - B** | 73 | 16 | 210 | 6.2U | 6.2U |
| | **TP-4C 5 ft - C** | 41 | 20 | 1.2U | 6U | 6U |
| **December 2006 Site 4 Investigation** | **MW-4C 0.5 ft** | 6.9U | 1.1 J | 1.4U | 6.9U | 6.9U |

**Units are in μg/L**

J - Estimated value
U - Compound not detected, reporting limit shown
UJ - Undetected due and biased low due to QA/QC deficiencies, reporting limit shown
NA - Data not available
NS - No standard
Standard* - NYSDEC Recommended Soil Cleanup Objective
Exceeds NYSDEC Recommended Soil Cleanup Objective

TABLE 5
Summary of SVOCs Detected in Soil
Site 4 Soil Borings
*Air National Guard - Hancock Field*

| Soil Boring Number and Depth | | 2-Methylnaphthalene | Acenaphthene | Anthracene | Benzo(a)anthracene | Benzo(a)pyrene | Benzo(b)fluoranthene | Benzo(ghi)perylene | Benzo(k)fluoranthene | bis(2-Ethylhexyl)phthalate | Carbazole | Chrysene | Dibenz(a,h)anthracene | Dibenzofuran | Dimethylphthalate | Fluoranthene | Fluorene | Indeno(1,2,3-cd)pyrene | Napthalene | Pentachlorophenol | Phenanthrene | Phenol | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Standard*** | **36400** | **50000** | **NS** | **224** | **61** | **1100** | **NS** | **1100** | **50000** | **NS** | **400** | **14** | **NS** | **2000** | **50000** | **50000** | **3200** | **NS** | **NS** | **NS** | **30** | **50000** |
| **Previous SA Report Borings** | **SB-01 2-4 ft** | NA | NA | 3900U | 3900U | 3900U | 3900U | 3900U | 3900U | NA | 3900U | 3900U | NA | 3900U | NA | 6500 | 3900U | 3900U | 3900U | 7800 | 4500 | NA | 5400 |
| | **SB-01 5-7 ft** | NA | NA | 400U | 400U | 400U | 400U | 400U | 400U | NA | 400U | 400U | NA | 400U | NA | 400U | 400U | 400U | 400U | 800 | 400U | NA | 400U |
| | **SB-02 2-4 ft** | NA | NA | 19000U | 19000U | 19000U | 19000U | 19000U | 19000U | NA | 19000U | 19000U | NA | 19000U | NA | 44000 | 19000U | 19000U | 19000U | 38000U | 45000 | NA | 40000 |
| | **SB-02 4-6 ft** | NA | NA | 810 | 970 | 780 | 980 | 440 | 410 | NA | 380U | 840 | NA | 380U | NA | 2400 | 380U | 470 | 380U | 760 | 2400 | NA | 1800 |
| | **SB-02 8-10 ft** | NA | NA | 390U | 390U | 390U | 390U | 390U | 390U | NA | 390U | 390U | NA | 390U | NA | 390U | 390U | 390U | 390U | 780 | 390U | NA | 390U |
| | **SB-03 2-4 ft** | NA | NA | 3900U | 7600 | 7400 | 8300 | 4700 | 4000 | NA | 3900U | 6800 | NA | 3900 | NA | 16000 | 3900 | 4600 | 3900U | 7800 | 12000 | NA | 14000 |
| | **SB-03 4-6 ft** | NA | NA | 380 | 380 | 380 | 380 | 380 | 380 | NA | 380 | 380 | NA | 380 | NA | 380 | 380 | 380 | 380 | 760 | 380 | NA | 380 |
| | **SB-04 2-4 ft** | NA | NA | 10000 | 13000 | 10000 | 13000 | 5400 | 5800 | NA | 4300 | 11000 | NA | 4900 | NA | 26000 | 6200 | 5700 | 4100 | 8100 | 33000 | NA | 25000 |
| | **SB-04 4-6 ft** | NA | NA | 390U | 390U | 390U | 390U | 390U | 390U | NA | 390U | 390U | NA | 390U | NA | 390U | 390U | 390U | 390U | 780 | 390U | NA | 390U |
| **January 2004 Site 4 Investigation** | **SB-4A 0.15 ft** | 38 J | 170 J | 380U | 2500 | 2800 | 2400 | 3300 | 2700 | 380U | 310 J | 3400 | 920 | 110 J | 380U | 5000 | 220 J | 2800 | 38 J | 1500U | 2700 | 380U | 6300 |
| | **SB-4B 0.15 ft** | 150 J | 360J | 24 J | 2700 | 2600 | 1800 | 2100 | 2300 | 940U | 640 J | 2800 | 580 | 670 J | 940U | 5100 | 770 J | 2000 | 120 J | 3800U | 5800 | 940U | 6100 |
| | **SB-4B 3 ft** | 420U | 420U | 420U | 9.5 J | 42U | 42U | 420U | 42U | 420U | 420U | 420U | 42U | 420U | 420U | 17 J | 420U | 42U | 420U | 1700U | 420U | 420U | 15 J |
| | **SB-4B 5 ft** | 420U | 420U | 420U | 42U | 42U | 42U | 420U | 42U | 420U | 420U | 420U | 42U | 420U | 420U | 15 J | 420U | 42U | 420U | 1700U | 420U | 420U | 13 J |
| | **SB-4C 0.15 ft** | 3000 J | 3200 J | 4400U | 11000 | 8200 | 6500 | 4400 J | 7900 | 4400U | 2800 J | 9800 | 1600 | 5000 | 4400U | 25000 | 7600 | 4700 | 3100 J | 18000U | 34000 | 6500 | 23000 |
| | **SB-4C 3 ft** | 390U | 390U | 390U | 39U | 39U | 39U | 390U | 39U | 390U | 390U | 390U | 39U | 390U | 390U | 390U | 390U | 39U | 390U | 1600U | 390U | 390U | 390U |
| | **SB-4C 5 ft** | 400U | 400U | 400U | 40U | 40U | 40U | 400U | 40U | 400U | 400U | 400U | 40U | 400U | 400U | 400U | 400U | 40U | 400U | 1600U | 400U | 400U | 400U |
| | **SB-4D 0.15 ft** | 410 J | 1000 J | 2000U | 7300 | 6700 | 5000 | 5500 | 5500 | 2000U | 1200 J | 7400 | 1900 | 880 J | 2000U | 12000 | 1700 J | 5200 | 440 J | 8200U | 12000 | 2000U | 16000 |
| | **SB-4D 3 ft** | 29 J | 180 J | 440U | 1600 | 1600 | 1200 | 1300 | 1400 | 190 J | 200 J | 1800 | 360 | 96 J | 440U | 3100 | 220 J | 1200 | 37 J | 1800U | 2200 | 440U | 3800 |
| | **SB-4D 7 ft** | 410U | 410U | 410U | 41U | 41U | 41U | 410U | 41U | 410U | 410U | 410U | 41U | 410U | 410U | 410U | 410U | 41U | 410U | 1600U | 410U | 410U | 410U |
| | **MW-4A 0.15 ft** | 400U | 400U | 400U | 40 J | 39 J | 31 J | 23 J | 40 J | 400U | 400U | 48 J | 40U | 400U | 400U | 96 J | 400U | 21 J | 400U | 1600U | 68 J | 400U | 74 J |
| | **MW-4A 3 ft** | 22 J | 19 J | 420U | 280 | 310 | 280 | 260 J | 330 | 420U | 77 J | 340 J | 55 | 24 J | 420U | 590 | 26 J | 230 | 20 J | 1700U | 410 J | 420U | 540 |
| | **MW-4A 11 ft** | 420U | 420U | 420U | 42U | 42U | 42U | 420U | 42U | 420U | 420U | 420U | 42U | 420U | 420U | 420U | 420U | 42U | 420U | 1700U | 420U | 420U | 420U |
| | **MW-4B 0.15 ft** | 450U | 450U | 450U | 31 J | 38 J | 36 J | 450U | 45 J | 100 J | 450U | 56 J | 45U | 450U | 450U | 85 J | 450U | 25 J | 450U | 1800U | 50 J | 450U | 85 J |
| | **MW-4B 3 ft** | 400U | 400U | 400U | 40U | 40U | 40U | 400U | 40U | 400U | 400U | 400U | 40U | 400U | 400U | 400U | 400U | 40U | 400U | 1600U | 400U | 400U | 400U |
| | **MW-4B 6 ft** | 410U | 410U | 410U | 41U | 41U | 41U | 410U | 41U | 410U | 410U | 410U | 41U | 410U | 410U | 410U | 410U | 41U | 410U | 1600U | 410U | 410U | 410U |
| | **TP-4A 4 ft - A** | 110 J | 300 J | 440U | 2000 | 1900 | 1400 | 1600J | 1800 | 100 J | 300 J | 2100 | 480 | 280 J | 440U | 3600 | 540 | 1500 | 110 J | 24 J | 3400 | 440U | 5300J |
| | **TP-4A 4 ft - B** | 3800U | 3500 J | 3800U | 22000 | 18000 | 14000 | 14000J | 18000 | 3800U | 3800U | 21000 | 4500 | 3800U | 3800 | 47000 | 6500 | 13000 | 1400 J | 15000U | 41000 | 3800U | 53000J |
| | **TP-4A 4 ft - C** | 94 J | 430 J | 850U | 4600 | 5100 | 4000 | 2900J | 4300 | 850U | 470 J | 5100 | 1200 | 450 J | 850U | 7100 | 910 | 3100 | 84 J | 920 J | 6400 | 850U | 9800J |
| | **TP-4B 4.5 ft - A** | 46 J | 200 J | 390U | 2200 | 2000 | 1600 | 1500J | 2000 | 88 J | 290 J | 2300 | 420 | 160 J | 390U | 4300 | 330 J | 1400 | 65 J | 1600U | 3000 | 390U | 4700J |
| | **TP-4B 4.5 ft - B** | 900 J | 2300 J | 3800U | 18000 | 18000 | 14000 | 12000J | 16000 | 3800U | 2600 J | 19000 | 35000 | 2200 J | 3800U | 37000 | 4200 | 11000 | 1300 J | 15000U | 30000 | 3800U | 43000J |
| | **TP-4B 5 ft - C** | 150 J | 690 J | 760U | 5500 | 5300 | 3800 | 3500J | 5000 | 760U | 750 J | 5900 | 1300 | 550 J | 760U | 9100 | 990 | 3700 | 180 J | 3000U | 8700 | 760U | 12000J |
| | **TP-4C 3 ft - A** | 220 J | 790 J | 790U | 4700 | 4500 | 3500 | 2800J | 3800 | 280 J | 740 J | 5400 | 1100 | 540 J | 790U | 8100 | 880 | 2700 | 180 J | 3200U | 8100 | 790U | 8700J |
| | **TP-4C 4 ft - B** | 400J | 2800J | 4200U | 23000 | 22000 | 19000 | 15000J | 21000 | 4200U | 3700J | 24000 | 5300 | 1600J | 4200U | 49000 | 3600J | 13000 | 560J | 17000U | 31000 | 4200U | 52000J |
| | **TP-4C 5 ft - C** | 59 J | 270 J | 410U | 3200 | 3000 | 2500 | 2800J | 2500 | 100 J | 310 J | 3500 | 970 | 210 J | 410U | 5600 | 440 | 2500 | 56 J | 490 J | 4100 | 410U | 7200J |
| **December 2006 Site 4 Investigation** | **MW-4C 0.5 ft** | 96 J | 180 J | 460 J | 670 | 540 | 480 | 230 J | 520 | 220 J | 160 J | 610 | 47U | 210 J | 470U | 1700 | 320 J | 200 | 180 J | 1400U | 1800 | 470U | 1300 |

**Units are in µg/L**

J - Estimated value
U - Compound not detected, reporting limit shown
UJ - Undetected due and biased low due to QA/QC deficiencies, reporting limit shown
NA - Data not available
NS - No Standard
Standard* - NYSDEC Recommended Soil Cleanup Objective
Exceeds NYSDEC Recommended Soil Cleanup Objective

TABLE 6
Summary of VOCs Detected in Groundwater
Site 4 Monitoring Wells
*Air National Guard - Hancock Field*

| Monitoring Well Number | | Acetone | Methylene Chloride | Tetrachloroethane | Toluene | Xylenes (total) |
|---|---|---|---|---|---|---|
| | **Standard*** | **50** | **5** | **5** | **5** | **5** |
| **Previous SA Report** | **MW-17GW** | 5U | 3U | 1U | 5U | 0.05U |
| **January 2004 Site 4 Investigation** | **MW-4A** | 5U | 3U | 1U | 5U | 5U |
| | **MW-4B** | 5U | 3U | 1U | 5U | 5U |
| | **MW-16** | 5U | 3U | 1U | 5U | 5U |
| | **MW-17** | 5U | 3U | 1U | 5U | 5U |
| | **MW-18** | 5U | 3U | 1U | 5U | 5U |
| **December 2006 Site 4 Investigation** | **MW-4A** | 5U | 3U | 1U | 5U | 5U |
| | **MW-4B** | 5U | 3U | 1U | 5U | 5U |
| | **MW-4C** | 5U | 3U | 1U | 5U | 5U |
| | **MW-16** | * | * | * | * | * |
| | **MW-17** | 5U | 3U | 1U | 5U | 5U |
| | **MW-18** | 5U | 3U | 1U | 5U | 5U |

**Units are in μg/L**

J - Estimated value
U - Compound not detected, reporting limit shown
UJ - Undetected due and biased low due to QA/QC deficiencies, reporting limit shown
NA - Data not available
NS - No standard
Standard* - NYSDEC Drinking Water Quality Standard (DWQS)
Exceeds NYSDEC DWQS
* - This monitoring well was not sampled during the December 2006 Site 4 Investigation since it was not accessable

TABLE 7
Summary of SVOCs Detected in Groundwater
Site 4 Monitoring Wells
*Air National Guard - Hancock Field*

| Monitoring Well Number | | Acenaphthene | Anthracene | Benzo(a)anthracene | Benzo(a)pyrene | Benzo(b)fluoranthene | Benzo(ghi)perylene | Benzo(k)fluoranthene | Carbazole | Chrysene | Dibenz(a,h)anthracene | Dibenzofuran | Dimethylphthalate | Fluoranthene | Fluorene | Indeno(1,2,3-cd)pyrene | Napthalene | Pentachlorophenol | Phenanthrene | Phenol | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Standard*** | **20** | **NS** | **NS** | **NS** | **NS** | **NS** | **NS** | **NS** | **NS** | **50** | **NS** | **50** | **NS** | **50** | **NS** | **NS** | **1** | **50** | **1** | **50** |
| **Previous SA Report** | **MW-17 GW** | NA | 5U | 5U | 5U | 5U | 5U | 5U | 5U | 5U | 5U | 5U | 5U | 5U | 5U | 5U | 5U | 10U | 5U | 5U | 5U |
| **January 2004 Site 4 Investigation** | **MW-4A** | 11U | 11U | 1.1U | 1.1U | 1.1U | 11U | 1.1U | 11U | 11U | 1.1U | 11U | 11U | 11U | 11U | 1.1U | 11U | 42U | 11U | 11U | 11U |
| | **MW-4B** | 10U | 10U | 1U | 1U | 1U | 10U | 1U | 10U | 10U | 1U | 10U | 10U | 10U | 10U | 1U | 10U | 40U | 10U | 10U | 10U |
| | **MW-16** | 10UJ | 10UJ | 1UJ | 1UJ | 1UJ | 10UJ | 1UJ | 10UJ | 10UJ | 1UJ | 10UJ | 10UJ | 10UJ | 10UJ | 1UJ | 10UJ | 42UJ | 0.7J | 10UJ | 0.3J |
| | **MW-17** | 11U | 11U | 1.1U | 1.1U | 1.1U | 11U | 1.1U | 11U | 11U | 1.1U | 11U | 11U | 11U | 11U | 1.1U | 11U | 46U | 11U | 11U | 11U |
| | **MW-18** | 1.4 J | 10U | 1U | 1U | 1U | 10U | 1U | 10U | 10U | 1U | 10U | 10U | 10U | 0.4 J | 1U | 10U | 41U | 10U | 10U | 10U |
| **December 2006 Site 4 Investigation** | **MW-4A** | 10U | 10U | 1U | 1U | 1U | 10U | 1U | 10U | 10U | 1U | 10U | 10U | 10U | 10U | 1U | 10U | 30U | 10U | 10U | 10U |
| | **MW-4B** | 10U | 10U | 1U | 1U | 1U | 10U | 1U | 10U | 10U | 1U | 10U | 10U | 10U | 10U | 1U | 10U | 30U | 10U | 10U | 10U |
| | **MW-4C** | 10U | 10U | 1U | 1U | 1U | 10U | 1U | 10U | 10U | 1U | 10U | 10U | 10U | 10U | 1U | 10U | 30U | 10U | 10U | 10U |
| | **MW-16** | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | **MW-17** | 10U | 10U | 1U | 1U | 1U | 10U | 1U | 10U | 10U | 1U | 10U | 10U | 10U | 10U | 1U | 10U | 30U | 10U | 10U | 10U |
| | **MW-18** | 0.9 J | 10U | 1U | 1U | 1U | 10U | 1U | 10U | 10U | 1U | 10U | 10U | 10U | 0.3 J | 1U | 10U | 30U | 10U | 10U | 10U |

**Units are in µg/L**

J - Estimated value
U - Compound not detected, reporting limit shown
UJ - Undetected due and biased low due to QA/QC deficiencies, reporting limit shown
NA - Data not available
NS - No standard
Standard* - NYSDEC Drinking Water Quality Standard (DWQS)
Exceeds NYSDEC DWQS

# Figures

f21_180533.dgn 16-OCT-2006

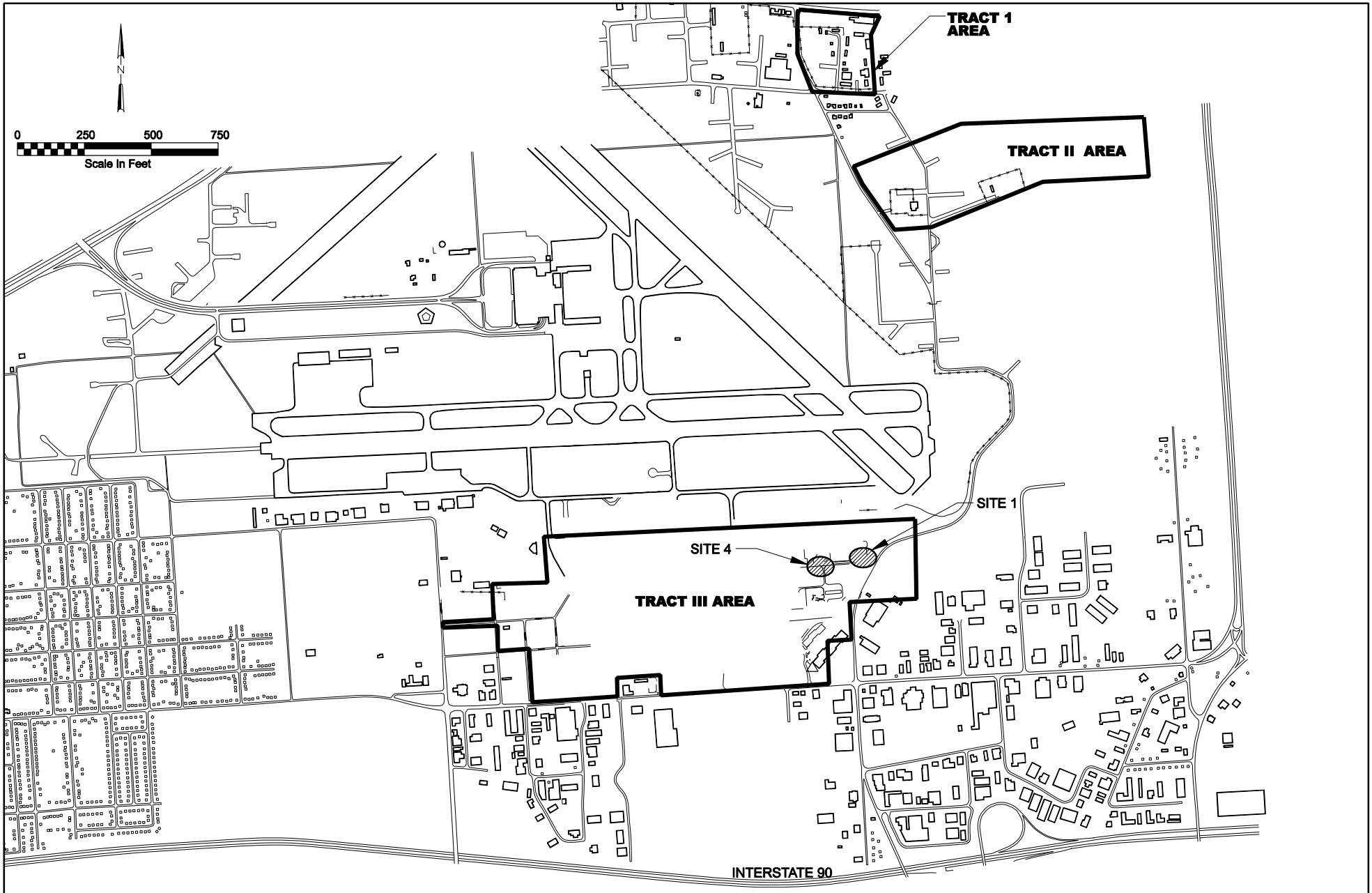



Figure 1
**SITE MAP**
Hancock Air National Guard Base
174th F. W. ANG
Syracuse New York

CH2MHILL

f24_345202.dgn 28-JAN-2007

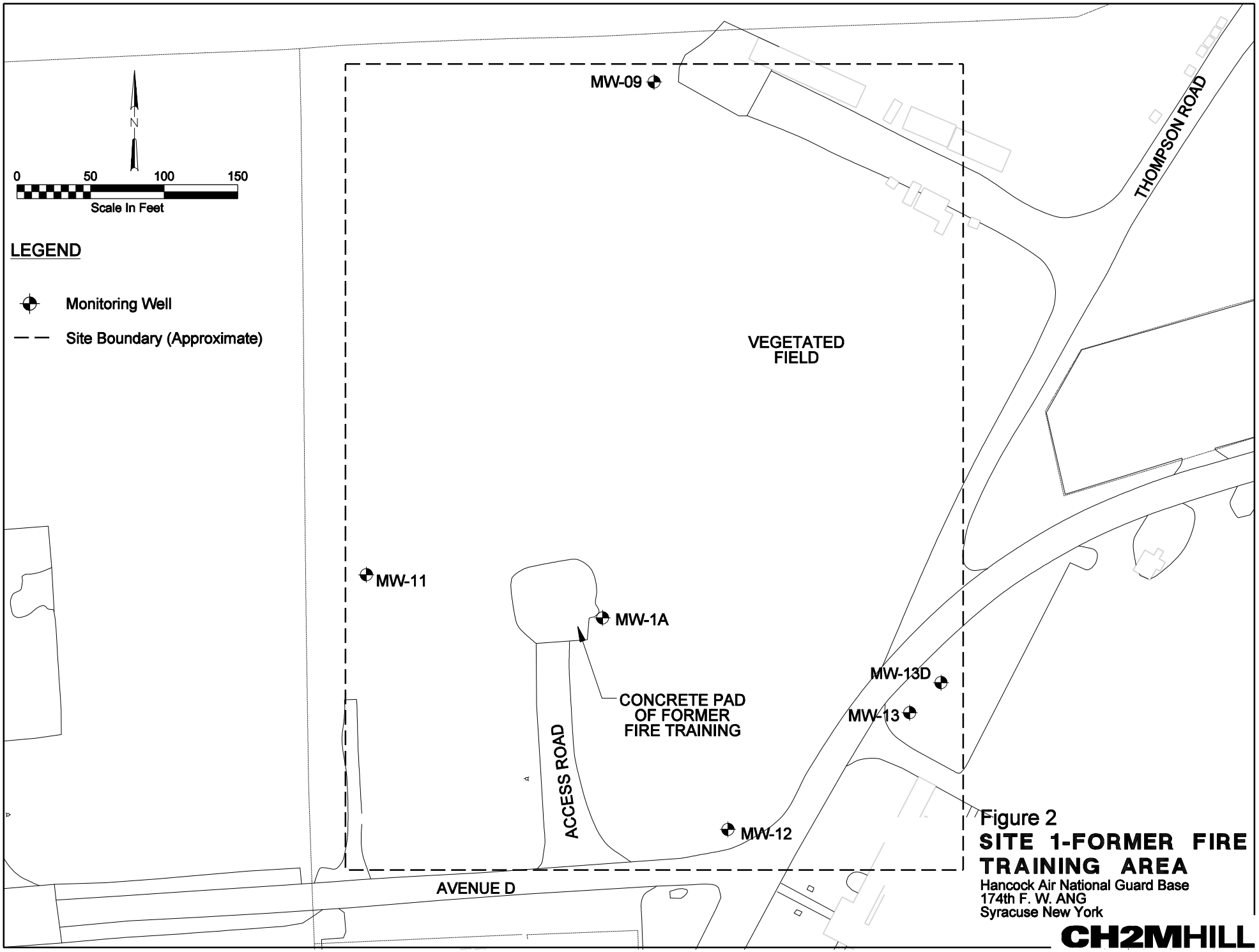



Figure 2

**SITE 1-FORMER FIRE TRAINING AREA**

Hancock Air National Guard Base
174th F. W. ANG
Syracuse New York

CH2MHILL

f27_180533.dgn

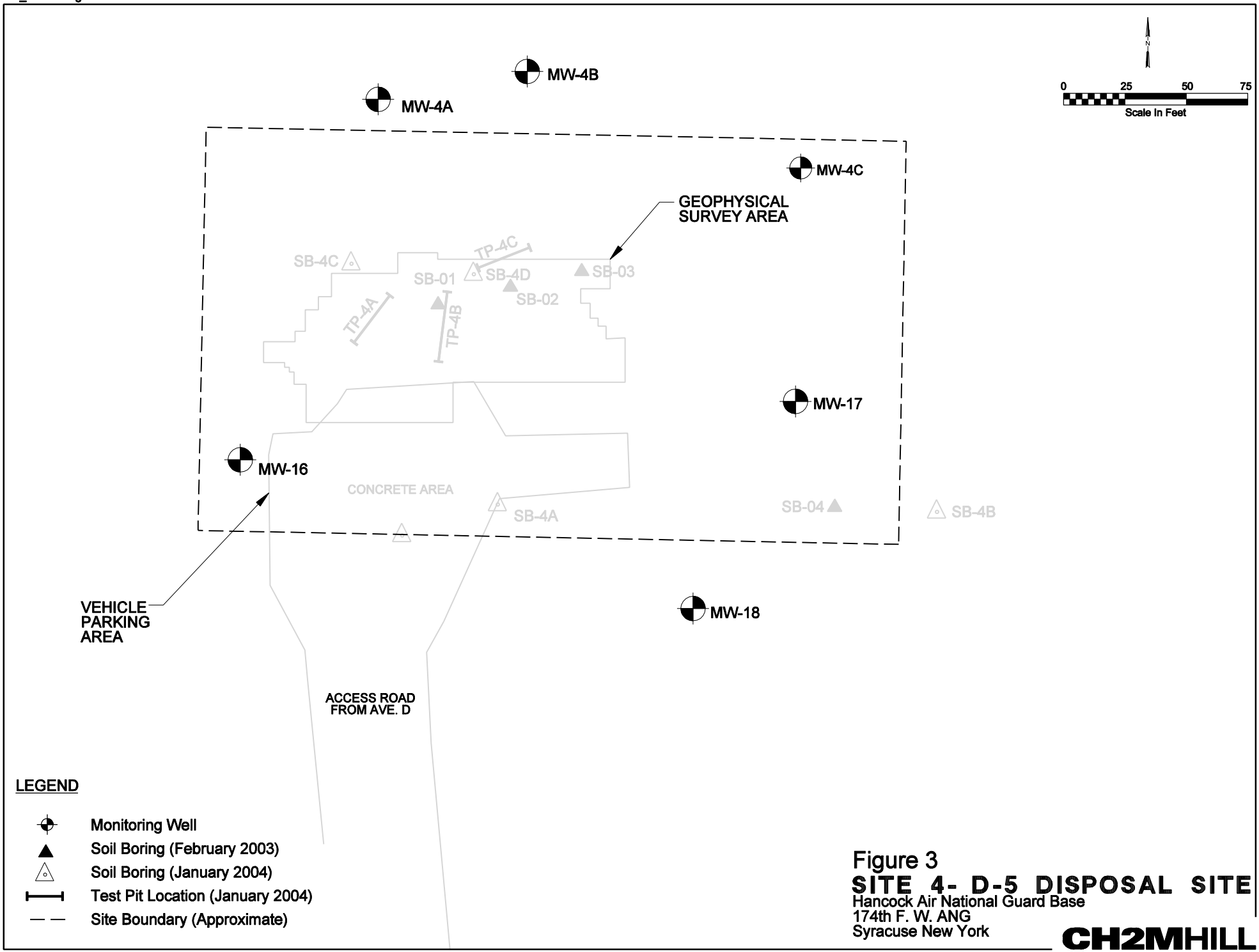



Figure 3

**SITE 4- D-5 DISPOSAL SITE**

Hancock Air National Guard Base
174th F. W. ANG
Syracuse New York

CH2MHILL

f26_345202.dgn 02-FEB-2007

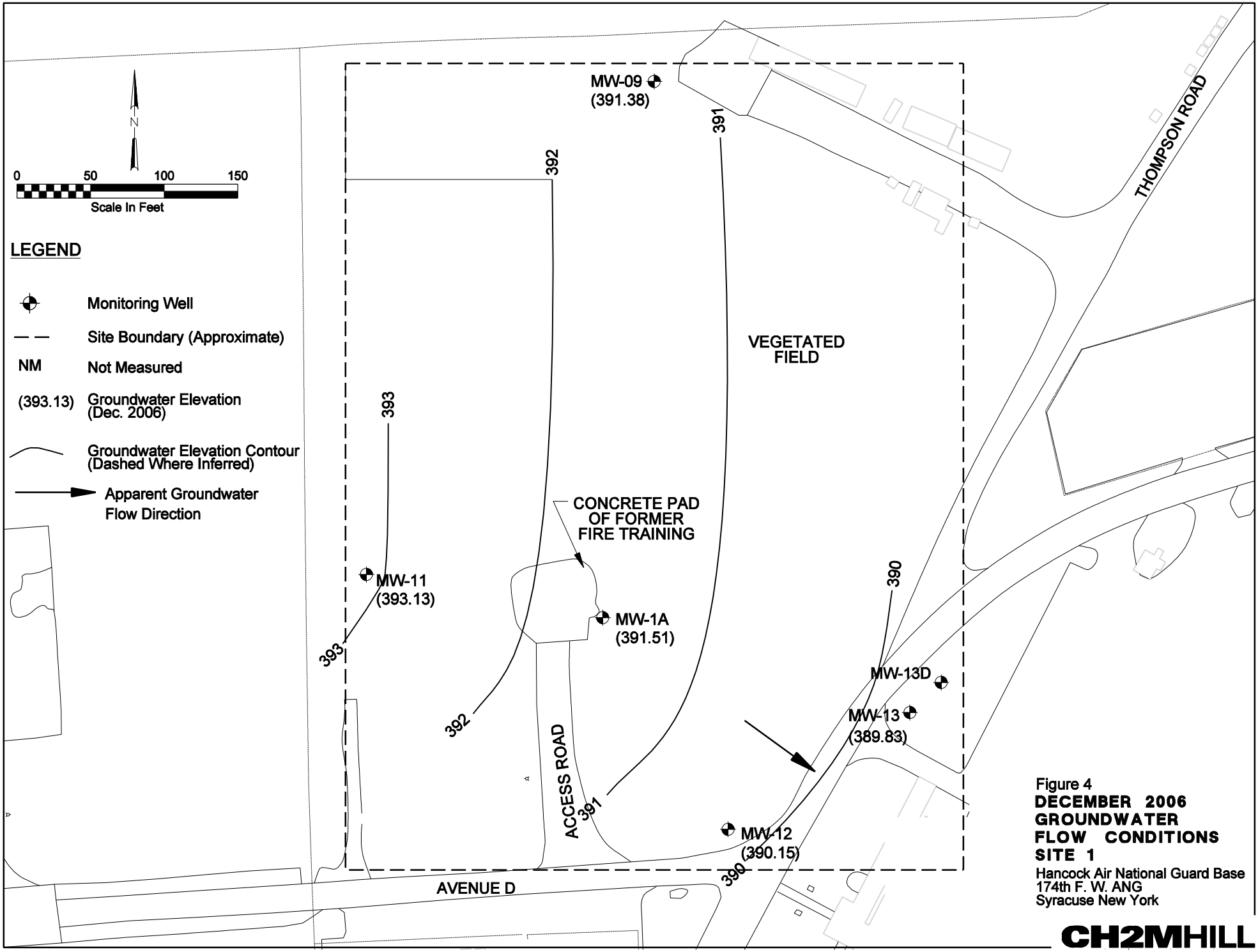



Figure 4
**DECEMBER 2006 GROUNDWATER FLOW CONDITIONS SITE 1**
Hancock Air National Guard Base
174th F. W. ANG
Syracuse New York

CH2MHILL

f25_345202.dgn 05-APR-2007

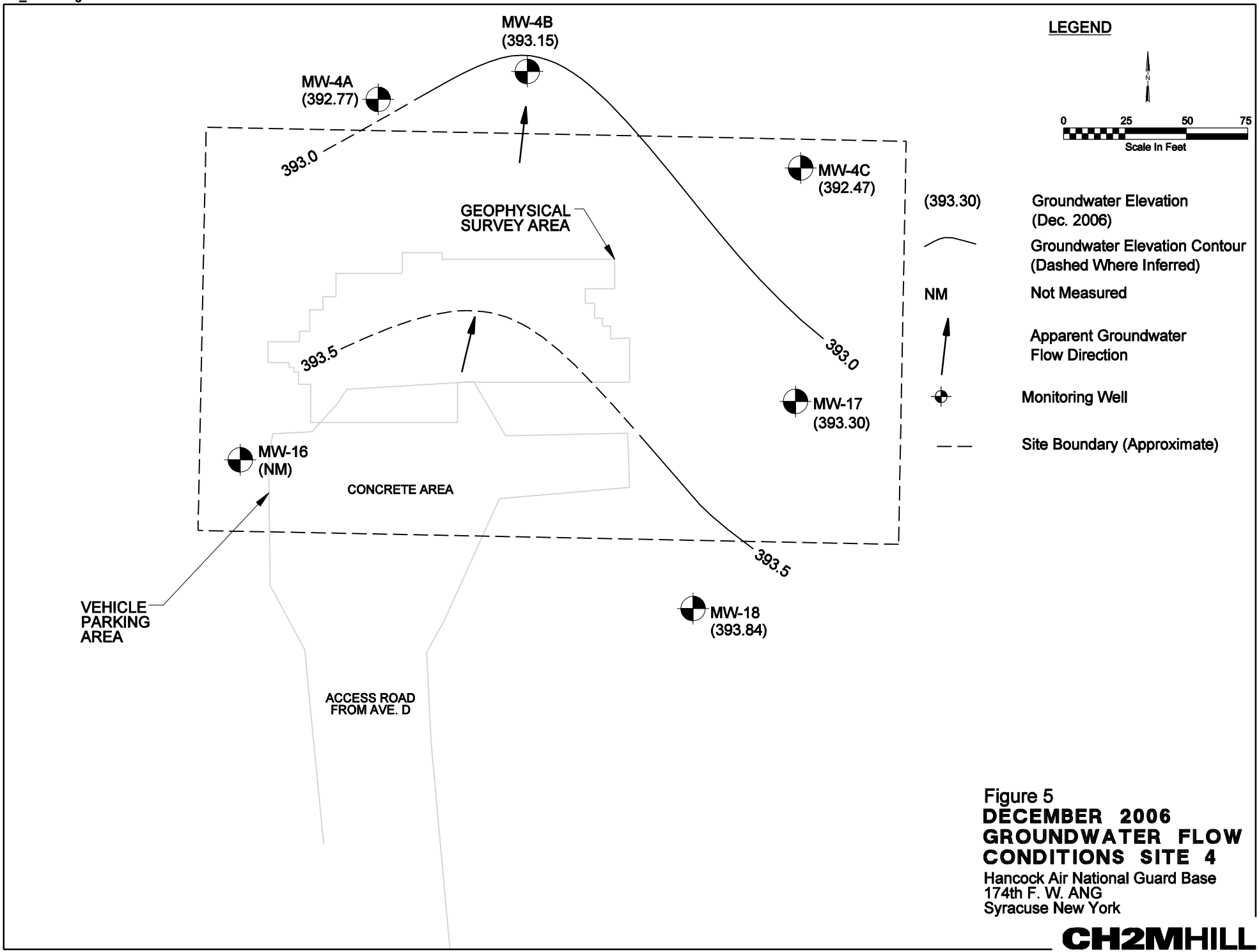



Figure 5
**DECEMBER 2006 GROUNDWATER FLOW CONDITIONS SITE 4**
Hancock Air National Guard Base
174th F. W. ANG
Syracuse New York

CH2MHILL

f29_345202.dgn 05-APR-2007

N

0 50 100 150

Scale In Feet

LEGEND

- Monitoring Well
- (393) Groundwater Elevation (December 2006)
- Groundwater Elevation Contour (Dashed Where Inferred)
- NM Not Measured
- Apparent Groundwater Flow Direction

SITE 4

SITE 1

MW-4B (393.15)
MW-4A (392.77)
MW-4C (392.47)
MW-17 (393.30)
MW-16 (NM)
MW-18 (393.84)
MW-11 (393.13)
GEOPHYSICAL SURVEY AREA
CONCRETE PAD
VEHICLE PARKING AREA
MW-09 (391.38)
MW-1A (391.51)
MW-13D
MW-13 (389.83)
MW-12 (390.15)
393
392
391
390

Figure 6
**DECEMBER 2006 GROUNDWATER FLOW CONDITIONS SITES 1 AND 4**
Hancock Air National Guard Base
174th F. W. ANG
Syracuse New York

CH2MHILL

# Appendixes

## Appendix A

# Soil Boring Log and Well Construction Diagram for MW-4C

CH2MHILL

| PROJECT NUMBER | BORING NUMBER MW-4C SHEET 1 OF 1 |
|---|---|

# SOIL BORING LOG

PROJECT: ANG Hancock / Syracuse, NY LOCATION: Syracuse, NY
ELEVATION: DRILLING CONTRACTOR: Parratt-Wolff
DRILLING METHOD AND EQUIPMENT USED: Diedrich D-120 - Hollow-Stem / 2' split spoon
WATER LEVELS: START: 1230 12/14/06 END: 1430 12/14/06 LOGGER: J. Zemlen

| DEPTH BELOW SURFACE (FT) | SAMPLE INTERVAL | SAMPLE NUMBER AND TYPE | SAMPLE RECOVERY (FT) | STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY. | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Headspace |
|---|---|---|---|---|---|---|
| 0 | | | | | Top 8" - Grass & Top Soil, Wet, Organics, 10YR 3/2, Dk. Yellowish Brn. V.F. Sand & Clay, Slight Plasticity, Med. Density | 0.0 ppm |
| 5 (12) | Hand Auger Top 2 ft | | | | 8-12" - 5 YR 6/3 - Lt. Reddish Brn, V.F. Sand & Silt, Med. Density, Wet. | |
| | | | | | 1'-2' - 7.5 YR 5/4 - Brn, F. Clay, Silt, & F. Sand. ~~Sand, Silt, & Clay~~ (55) Dense, Wet, Slight Plasticity | 0.0 ppm |
| | | | | 2-2.5 | ~~2-3~~ 2.5' bgs, SAA - 7.5 YR 5/4 | |
| 5 | 4-6' | SS1 | 22" | ~~WOH-1-2-3~~ (55) 2-2-2-3 | Brn, Clay, Silt, & F. Sand, Wet, Dense, Slight Plasticity | 0.0 ppm |
| | | | | | 2.5-3' - 10 YR 5/3, Brn, Clay & Silt, Trace F. Sand, Wet Dense, V. Plastic | |
| | 6-8' | SS2 | 22" | WOH-1-2-3 | 3-4' - SAA, 10 YR 5/3, Brn | 0.0 ppm |
| | | | | | 4-6' - SAA, 10YR 5/3, Brn | |
| 15 (50) | 8-10' | SS3 | 15" | 2-1-1-2 | 6-8', SAA, 10 YR 5/3, Brn | 0.0 ppm |
| | | | | | 8-10', SAA, 10YR 5/3, Brn | |
| 10 | 10-12' | SS4 | 12" | 1-1-2-2 | 10-12', SAA, 10YR 5/3, Brn | 0.0 ppm |
| | 12-14' | SS5 | 24" Full Recovery | 1-2-1-2 | 12-14', SAA, 10YR 5/3, Brn | 0.0 ppm |
| 25 (43) | | | | | | |
| | | | | | B.O.B. @ ≈ 14' bgs | MW-4C Set to 14' bgs. Screened interval: 4-14' bgs |
| (53) 30 15 | | | | | | |

| PROJECT NUMBER | WELL NUMBER | |
|---|---|---|
| 345202 | MW-4C | SHEET 1 OF 1 |

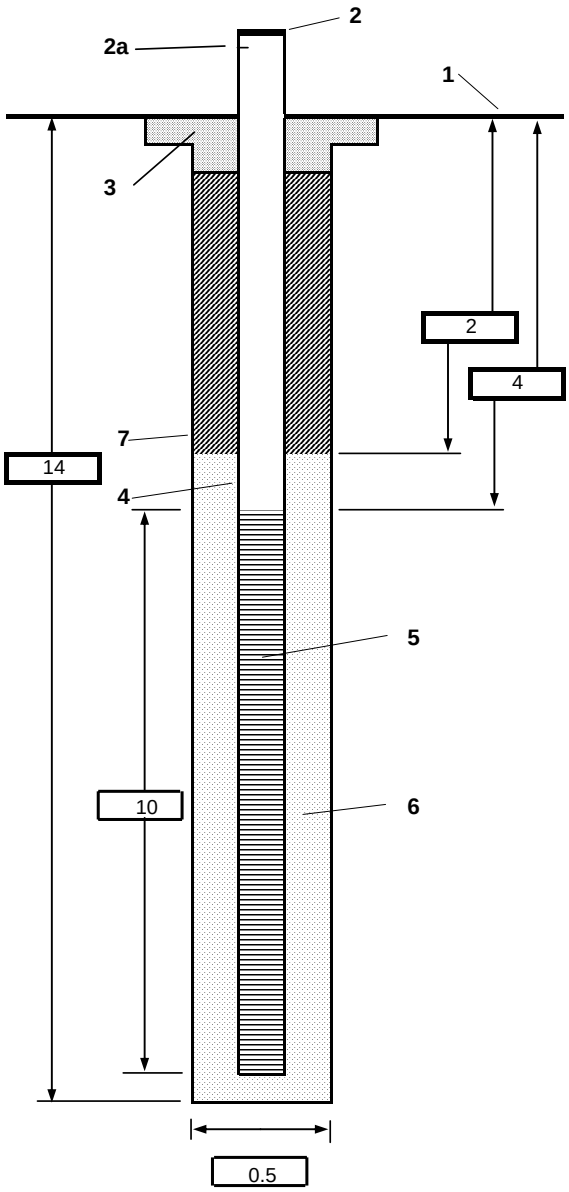
# WELL COMPLETION DIAGRAM

PROJECT : Air National Guard Hancock, Sites 1 and 4 SI addendum LOCATION : Site 4

DRILLING CONTRACTOR : Parratt Wolfe

DRILLING METHOD AND EQUIPMENT USED : Hollow-stem auger, 4 1/2-inch inside diameter augers, 2-foot x 2-inch split spoons

WATER LEVELS : START : END : LOGGER : Ian Zmudzin




| | | |
|---|---|---|
| 1- | Ground elevation at well | 392.52 |
| 2- | Top of casing elevation | 394.76 |
| | a) vent hole? | NA |
| 3- | concrete pad dimensions | 2 feet x 2 feet |
| 4- | Dia./type of well casing | 2-inch schedule 40 PVC |
| 5- | Type/slot size of screen | 2-inch schedule 40 PVC<br>0.010-inch slot screen |
| 6- | Type screen filter | No. 2 morie sand |
| | a) Quantity used | |
| 7- | Type of seal | Bentonite chips |
| | Development method | Pump and surge, 2-inch submersible pump |
| | Development time | 1 hour |
| | Estimated purge volume | 10 gallons |
| | Comments | Units are in feet. |

## Appendix B

# Data Validation Memorandum

## Appendix C

# Data Validation Results