105th AIRLIFT WING
NEW YORK AIR NATIONAL GUARD
STEWART AIR NATIONAL GUARD BASE
NEWBURGH, NEW YORK

Prepared for:

NGB/A7CVR
Andrews Air Force Base, Maryland

FINAL
ANNUAL 2008
LONG TERM MONITORING PROGRAM REPORT
SITE 1 FORMER BASE LANDFILL
PROJECT # ANGR057784A

Contract No. DAHA92-01-D-006
Delivery Order No. 0088
January 2009

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Prepared for:

NGB/A7CVR
Andrews AFB, Maryland

Prepared by:

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285 Davidson Avenue
Somerset, NJ 08873
AMEC Project No. 27622-0088

January 2009

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LIST OF FIGURES, TABLES AND APPENDICES

LIST OF ACRONYMS / ABBREVIATIONS

AMEC	AMEC Earth & Environmental, Inc.
ANGB	Air National Guard Base
AW	Airlift Wing
AWQS	NYSDEC Ambient Water Quality Standard
bgs	Below ground surface
CO	Carbon Monoxide
DOT	Department of Transportation
EPA	U.S. Environmental Protection Agency
FID	Flame Ionization Detector
GC	Gas Chromatography
H_2S	Hydrogen Sulfide
ID	Inner Diameter
IDW	Investigation Derived Waste
LEL	Lower Explosive Limit
LTMP	Long Term Monitoring Program
MCL	Maximum Contaminant Level
MDL	Method Detection Limit (also referred to as IDL-Instrument Detection Limit)
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MW	Monitoring Well
NAPL	Non-Aqueous Phase Liquid
ND	Non-detect
NGB	National Guard Bureau
NGB/A7CVR	Air National Guard, Civil Engineering and Services Directorate, Environmental Division, Environmental Restoration Branch
NYANGB	New York Air National Guard Base
NYCRR	Codes, Rules, and Regulations of the State of New York (6 NYCRR Part 360 contains regulations pertaining to Solid Waste Management Facilities)
NYSDEC	New York State Department of Environmental Conservation
O_2	Oxygen
PID	Photoionization Detector
PPB	Parts per Billion *(e.g.*, ug/L)
PPE	Personal Protective Equipment
PPM	Parts per Million (*e.g.*, mg/L)
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RL	Reporting Limit (also referred to as CRDL-Contract Required Detection Limit)
SHSO	Site Health and Safety Officer
SOW	Statement of Work
SSHP	Site-Specific Safety and Health Plan
SVOC	Semi-Volatile Organic Compound
SWL	Static Water Level
TOC	Top of the PVC/Steel Well Casing
µg/l	Micrograms per Liter
VOC	Volatile Organic Compound
WP	Work Plan

1.0 INTRODUCTION

AMEC Earth & Environmental, Inc. (AMEC), under contract with the Air National Guard, Civil Engineering and Services Directorate, Environmental Division, Environmental Restoration Branch (NGB/A7CVR), Andrews Air Force Base, Maryland, has prepared this Annual Report for the Long Term Monitoring Program (LTMP) at Site 1, the Former Base Landfill, located at the Stewart Air National Guard Base (ANGB) in Newburgh, New York (Project # ANGR057784A). This document was developed in accordance with Contract DAHA92-01-D-0006, Delivery Order No. 0088 and New York State Department of Environmental Conservation (NYSDEC) 6 NYCRR Part 360 regulations. Information provided by the LTMP will support the final closure evaluation for Site 1.

1.1 PROJECT OBJECTIVES AND SCOPE

The primary objective of the LTMP is to fulfill the closure requirements for Site 1, Former Base Landfill at Stewart ANGB. This objective is currently being fulfilled through the performance of two tasks:

- The Field Sampling Program, which entails annual collection of ground water samples for laboratory analysis from six on-site monitoring wells, and direct measurement of vapor/gas emissions along the perimeter of the former landfill; and
- LTM Reporting, which encompasses the submission of Annual Reports describing compliance sampling/monitoring activities.

In accordance with 6 NYCRR Part 360, consultation with NYSDEC, and prior submittal of LTM variance documentation[1], the monitoring program has transitioned over the past eight years from a quarterly frequency to a serniannual frequency, and currently, to an annual frequency.

This document outlines the procedures being employed to perform the LTMP Field Sampling Program, and summarizes the results of the annual LTMP sampling event. Field Sampling Program procedures were documented previously in the *Draft Abbreviated Work Plan (AWP): Compliance Program Services for Long Term Monitoring at Site 1, Former Base Landfill, 105th Airlift Wing, New York Air National Guard, Stewart International Airport, Newburgh, New York*, dated May 2008 (AMEC, 2008a).

1.2 GENERAL LTMP APPROACH

LTMP performance under the subject Delivery Order consists of the collection of ground water samples from six (6) monitoring wells and performance of landfill gas monitoring around the perimeter of the Site 1 landfill on an annual basis for two (2) years. Ground water samples are analyzed for Baseline Parameters (Field Parameters, Leachate

[1] Specifically, documentation to request a variance from the long term monitoring program requirements of 6 NYCRR Part 360 and 40 CFR Part 258 Subpart E, in accordance with the criteria established in the NYSDEC Memorandum of January 26, 1996 from Norman Nosenchuck, Director, Division of Soild & Hazardous Materials, entitled: Delegation of Certain Landfill Closure Variance Authority (also as modified in August 12 1998 NYSDEC correspondence from Stephen Hammond, Director, Division of Solid & Hazardous Materials).

Indicators, Inorganic Parameters, and Organic Parameters) in accordance with 6 NYCRR 360-2.11(d)(6).

Ground water sample analyses are conducted following the methods prescribed in EPA Report SW-846 *Test Methods for Evaluating Solid Waste*, Third edition, November 1986, as revised December 1987, and *Methods for Chemical Analysis of Water and Wastes*, USEPA-600/4-79-020, March 1979 for the specific constituents of concern (COC).

Landfill gas monitoring consists of advancing holes with a slide-hammer ("*slam bar*") every 100 feet around the landfill perimeter and monitoring the opening of each hole with a Flame Ionization Detector (FID) and a combined 4-gas Oxygen (O_2), Carbon Monoxide (CO), Lower Explosive Limit (LEL), and Hydrogen Sulfide (H_2S) meter. Landfill gas monitoring was conducted during each of the semiannual sampling events in accordance with NYCRR Part 360-2.17(f).

Annual LTMP data will be used to determine compliance with final closure requirements of 6 NYCRR Part 360.

2.0 INSTALLATION BACKGROUND INFORMATION

This section presents abbreviated background information for the installation including installation description and history, and a description of investigations previously conducted at Site 1.

2.1 INSTALLATION DESCRIPTION

The Stewart ANGB is located within the Stewart International Airport (IAP) facility. The IAP is located approximately 2.5 miles west of the City of Newburgh in the Towns of Newburgh and New Windsor, Orange County, New York, and is situated adjacent to the New York State Thruway (Route 87); Figure 2-1. The IAP encompasses 9,800 acres and is bounded in the Town of Newburgh on the west and northwest by industrial zones and on the north and east by Thruway interchange business zones. In the Town of New Windsor, the IAP is bounded on the south and southwest by airport zones, on the southeast by planned industrial zones and to the east by office and light industrial zones (E.C. Jordan, 1989). Residential homes are also scattered throughout these areas.

The Base is the headquarters for the 105th Airlift Wing (AW). The 105th AW conducts strategic airlift missions. The Base was originally constructed in 1941, and was initially owned and operated by the United States Air Force (USAF) from 1941 to 1969. The Stewart IAP is currently owned by the NYS Department of Transportation (DOT), which took possession in 1969. The DOT leases property to the NYANG and to several private companies for aviation activities and light manufacturing.

2.2 SITE DESCRIPTION

Site 1, the Former Base Landfill, consists of approximately 8.5 acres located in the southeastern portion of the Base (Figure 2-2). The landfill received municipal domestic waste from former on-site residents during the 1960s and 1970s when the USAF occupied the Base. Based upon available information, the approximate volume of material contained in the landfill is estimated to be 104,350 cubic yards. The maximum depth of material placed into the landfill is estimated to be 22.5 feet. Construction of the landfill cap was begun in April of 1998 and completed in the summer of 1999. The landfill is undergoing a final closure in accordance with 6 NYCRR Part 360[2].

The NYS Landfill Closure Codes, Rules, and Regulations require long term monitoring after the final landfill cover is in place. The LTMP must be in place during the post closure period for a minimum of 30 years.

[2] Comprehensive revisions and enhancements to Title 6 NYCRR Part 360 regulations were announced by the NYSDEC in 2006, and public comment was closed in July of that year. As of the date of this report, rulemaking for these revisions has not been completed. Regulations pertinent to the Site 1 Landfill, currently contained in Subpart 360-2 (Landfills) of Part 360, will be contained within a new Part 363 (Solid Waste Landfills). Based on review of the pre-proposal draft, post-closure monitoring requirements appear to be consistent with the current regulations.

2.3 PREVIOUS LTMP INVESTIGATIONS

Aneptek Corporation (Aneptek) performed long term monitoring of the Former Base Landfill from August 2000 through August 2003. This work included: ten (10) ground water sampling events and ten (10) landfill gas monitoring events. Of the ten ground water sampling events, samples from three (3) events were analyzed for Baseline Parameters and seven (7) were analyzed for Routine Parameters in accordance with 6 NYCRR Part 360. Ground water sampling results were compared to both EPA Drinking Water Regulations and Advisories Maximum Contaminant Levels (MCLs), and NYSDEC Ambient Water Quality Standards (AWQS) and Guidance Values. Results from the Aneptek LTMP indicated that the landfill cap and gas venting system installed as part of the landfill closure are performing as designed. Although exceedences of regulatory drinking water quality standards were noted during each of the Aneptek sampling events, contaminant levels in ground water remained relatively consistent throughout the duration of the program. Landfill gas monitoring results showed a decline in volatile gases and LEL readings as the program progressed.

3.0 LTMP INVESTIGATIVE APPROACH

The primary scope of the LTMP is to collect ground water quality and landfill gas information from Site 1. This information is used to evaluate compliance with 6 NYCRR Part 360 and support final closure for the Former Base Landfill. The rationale for sampling; description of proposed field procedures; laboratory analytical parameters and methods; and type, number, and locations of samples are described herein, and were documented in the Final LTMP Abbreviated Work Plan (AMEC 2008c).

As noted previously, prior LTMP monitoring has identified exceedences of regulatory drinking water standards (Aneptek, 2004). Concentrations of regulated constituents in ground water and indicator constituents in landfill gas have generally remained consistent or decreased from the initial sampling conducted by Aneptek between 1999 and 2003. The objectives for the Site 1 LTMP are to: (1) evaluate ground water quality at the site; (2) monitor landfill perimeter soil gas levels; and (3) obtain the necessary information to support landfill closure. The following activities were proposed in the Draft LTMP Abbreviated Work Plan (AMEC, 2008a) to provide the necessary information to fulfill the Site 1 objectives:

3.1 GROUND WATER SAMPLING

The first of two scheduled annual LTMP ground water sampling events, under Delivery Order No. 0088, took place on 25-26 June 2008 Sampling was completed at six monitoring wells (MW-4, MW-7, MW-8, MW-9, MW-10, MW-11). Ground water samples were analyzed for 6 NYCRR Part 360 "Baseline" Parameters, consisting of Field Parameters, Leachate Indicators, Inorganic Parameters and Organic Parameters, as specified at NYCRR 360-2.11.

3.2 LANDFILL GAS MONITORING

Landfill gas monitoring is performed in conjunction with each of the annual ground water sampling events, and occurred on 25 June 2008. During each event, landfill gas monitoring is conducted and sampled for methane, O_2, CO, LEL, and H_2S at specified intervals around the landfill perimeter in accordance with 6 NYCRR Part 360-2.17(f)[3].

[3] Pending (2006) revisions to 6 NYCRR Part 360 re-codify Section 2.17(f) as new Subpart 363-10.1(g); the content of these proposed regulations do not differ from those currently in place.

4.0 FIELD INVESTIGATION/ANALYTICAL PROCEDURES

The following field procedures were implemented during the annual sampling event. These procedures were compliant with the specifications of the Final LTMP Abbreviated Work Plan (AMEC, 2008c), prior practices at the site, and 6 NYCRR Part 360 regulations.

4.1 MONITORING AND SAMPLING

4.1.1 Ground Water

Upon opening each monitoring well, the interior of the casing was monitored with a FID / 4-Gas meter. Once methane, O2, LEL and H_2S levels were determined to be within safe working limits, the static depth to water and the total depth of the well was measured. Polyethylene tubing was then placed in the well at the midpoint of the observed water column. The well was then purged with a peristaltic or submersible pump using low-flow techniques; *i.e.*, flow rate of approximately 0.1 – 0.5 L/min, with continuous monitoring of field indicator parameters (temperature, specific conductance, pH, ORP, DO, and turbidity) in a flow-through cell connected to the pump discharge. Indicator parameter concentrations were recorded at the initiation of purging and at five-minute intervals thereafter. Purging continued until stabilization of specific conductance, temperature, pH, and turbidity was obtained, evacuation of three well volumes was achieved, or the well was dewatered. The stabilization objective was three (3) consecutive sets of readings that fell within the following guidelines:

- Specific conductivity readings within 10%;
- Temperature readings within 1 degree;
- pH readings within 0.2 standard units; and
- Turbidity less than 50 NTUs or until stability within 10%.
- Dissolved oxygen within 10%; and
- Redox potential within 10 mV.

All ground water samples were obtained in-line, directly from the pump discharge tubing, and were collected by analytical fraction in the following order:

- Organic Parameters;
- Inorganic Parameters; and
- Leachate Indicators.

The June 2008 LTMP event consisted of sampling and analysis for NYCRR Part 360 Baseline Parameters. Well Sampling and Purging Logs are contained in Appendix A, and include documentation of Field Parameters measured during the purging operations.

4.1.2 Landfill Gas

Landfill gas monitoring consisted of advancing holes with a slide hammer ("*slam bar*") to a depth of 12-14 inches below ground surface (bgs) at intervals of approximately 100 feet around the landfill perimeter. The opening of each hole was then monitored with a FID for methane and a combined 4-gas meter for O_2, CO, LEL, and H_2S. Landfill gas monitoring was performed at twenty-six (26) locations during the annual LTMP event, in accordance with the requirements of NYCRR Part 360-2.17(f).

4.2 Field Quality Assurance/Quality Control (QA/QC)

During the LTMP sampling event, ground water QA/QC samples collected included one duplicate sample, one trip blank (for Organic Parameters), and one Matrix Spike/Matrix Spike Duplicate. Field monitoring instruments (Horiba U-22 Water Quality Meter, FID and 4-gas meter) were calibrated before use, and subsequently prior to daily usage. Samples were labeled at the time of acquisition, maintained in the field within an iced sample cooler, and submitted to the designated fixed-base laboratory (Test America-Connecticut) under strict chain-of-custody protocols. Chain-of-custody forms associated with the LTMP events are contained in Appendix B with the laboratory analytical data package (Adobe .pdf format on CD-ROM).

4.3 Equipment Decontamination

Monitoring well purging equipment[4] and landfill gas sampling tools were decontaminated before first use on site and between sample locations. Decontamination of sampling equipment occurred at a portable decontamination station set up between the sampling locations. Decontamination consisted of: (1) hand wash with a bristle brush and a soap solution (Liquinox®) followed by a thorough rinse with tap water; (2) rinse in a bath with potable water; (3) final rinse with deionized water; and (4) air drying.

4.4 Investigation Derived Waste (IDW) Management

Based on the analytical results from historical LTMP ground water sampling activities, the recommended disposal option for purge/decontamination water generated during the LTMP was discharge to the ground surface, consistent with prior practice.

[4] Submersible pump; all other equipment (*i.e.*, tubing, bailer) was purchased pre-cleaned and was disposed between each sampling location.

5.0 ANNUAL 2008 SAMPLING RESULTS

5.1 GROUND WATER SAMPLING RESULTS

Six (6) monitoring wells were sampled on 25-26 June 2008 during the Annual 2008 LTMP event. The monitoring wells sampled were: MW-04, MW-07, MW-08, MW-09, MW-10, and MW-11 (Figure 5-1). Samples were analyzed for 6 NYCRR Part 360 Baseline Parameters, and laboratory data deliverables are contained in Appendix B (Adobe .pdf format on CD-ROM); data package designations are as follows:

Laboratory Data Package	Monitoring Wells	QA/QC Samples	Analytes
220-5646	MW-4, MW-7, MW-8, MW-9, MW-10, MW-11	Duplicate (MW-7-02) Trip Blank (TB-062508) Matrix Spike/Dupe MW-7-03 MS MW-7-03 MSD	6 NYCRR Part 360 Baseline Parameters

Duplicate samples collected at well MW-7(MW-7-02), matrix spike and matrix spike duplicate samples collected at well MW-7 (MW-7-03 (MS) and MW-7-03 (MSD)), and a trip blank (TB-062508), which accompanied the sample cooler both to and from the analytical laboratory, were analyzed to fulfill the project QA/QC requirements. The results of the Annual 2008 LTMP ground water sampling are presented in Table 5-1 and discussed below.

5.1.1 Organic Parameter Results

Two volatile organic compounds (VOCs) were detected at concentrations in excess of NYSDEC Ambient Water Quality Standards (AWQS): vinyl chloride, and cis-1,2-dichloroethene (1,2-DCE). The presence of these two constituents is believed to be the result of anaerobic dechlorination of low concentration solvent constituents within the landfill. During the June 2008 event, vinyl chloride was detected at a concentration of 24 ug/L in MW-09. It has historically been detected at this well, with concentrations ranging from 2.1 ug/L to 37 ug/L. The observed June 2008 concentration is higher than that observed during the prior monitoring event (16 ug/L, April 2007), but lower than the preceding period (December 2006), where it was detected at 37 ug/L. Time series analysis indicates that a gradually increasing concentration trend for this constituent ended after the December 2006 monitorng event, and the trend now appears to be oscillation in the 15-25 ug/L range.

1,2-DCE was detected in wells MW-09 and MW-10, at concentrations of 20 ug/L and 14 ug/L, respectively. This constituent is routinely detected in MW-09 and sporadically detected in MW-10. The prior maximum concentration for 1-2, DCE in MW-09 was 11 ug/L (December 2006) and in MW-10 was 5.1 ug/L (July 2003). It is not known at this time whether the levels observed in June 2008 represent a rising trend in concentration at these wells, or simply seasonal or sampling variability. The sporadic presence of VOCs in MW-10 is presumably associated with it's proximity to MW-09.

Four additional VOCs were detected during the June 2008 event below NYSDEC AWQS: chloromethane, methylene chloride, toluene and xylene (m&p isomers). Detection of all of these constituents was qualified ("J" qualifier), and they were observed sporadically across most of the Site 1 wells (MW-04, MW-07, MW-09, MW-10, MW-11) at concentrations ranging from 0.40 ug/L to 2.7 ug/L. Due to presence of chloromethane in the trip blank, the nature of the other detected constituents (routinely associated with low-level, incidental field or laboratory contamination), and the historical record (e.g., AMEC, 2007, 2008a), it is believed that the presence of these constituents represents an artifact of the sampling and analytical process.

5.1.2 Inorganic Parameter Results

Non-qualified inorganic parameters detected in Site 1 ground water during the Annual 2008 LTMP event consisted of: aluminum, barium, boron, calcium, iron, magnesium, manganese, potassium, andsodium..

Three inorganic constituents exceeded AWQS in Site 1 ground water: iron was detected in MW-10 (500 ug/L) and MW-11 (1,600 ug/L) in excess of the AWQS of 300 ug/L; manganese was detected in MW-4 (370 ug/L), MW-9 (4,800 ug/L) and MW-10 (380 ug/L) in excess of the AWQS of 300 ug/L; and sodium was detected in MW-4 (29,400 ug/L), MW-7 (33,300 ug/L), MW-9 (53,600 ug/L), and MW-10 (27,300 ug/L), in excess of the AWQS of 20,000 ug/L. Only the manganese concentration at MW-09 appears anomalous compared to historical data; previously, the highest managanese concentration in Site 1 ground water occurred at MW-09 in December 2001 (2,580 ug/L).

Manganese and sodium are observed at concentrations in excess of AWQS in the Site 1 upgradient well (MW-04), and iron is also present at an elevated concentration at that location (280 ug/L). Based on the historical record (AMEC 2007, 2008a) the elevated concentrations of these constituents are believed to represent characteristic, background conditions for the area. The elevated manganese concentration at MW-09 appears somewhat anomalous, but is consistent with the fact that this well appears to lie within a dilute leachate plume emanating from the landfill (as also evidenced by the results of the VOC and leachate indicator analyses).

5.1.3 Leachate Indicator Results

Except for the detection of phenols at MW-09 (0.0062 ug/L; AWQS = 0.001 ug/L), no unqualified exceedances of leachate indicator constituents were recorded within Site 1 ground water. Previously, phenolic compounds have been detected very rarely and sporadically in Site 1 ground water (AMEC, 2007, 2008a).

5.1.4 Data Quality

The laboratory failed to provide sufficient H_2SO_4 preserved 40 ml septum cap vials to obtain the full volume of ground water for VOC and TOC analyses specified in Test Methods SW846-8260B and 9060. However, additional sample volume was not required for any of

the environmental sample analyses, and the provided volume was sufficient to achieve project requirements without detriment. As noted in the Case Narrative, recovery of the surrogate 4-Bromofluorobenzene was slightly outside and below control limits (70% relative to control limits of 73%-127%) in Matrix Spike Blank (MSB) batch 220-17589; this condition did not result in qualification of project target analytes. All of the QA/QC analytical results for inorganic parameters and leachate indicator parameters were within established control limits.

5.2 LANDFILL GAS MONITORING RESULTS

Landfill gas sampling is performed around the periphery of the Site 1 landfill to monitor the composition of decomposition gases. Sampling is performed using a flame ionization detector (FID) to monitor methane gas, and a 4-gas meter to monitor oxygen (O_2), carbon monoxide (CO), hydrogen sulfide (H_2S), and combustible gas (% LEL calibrated to methane). This monitoring is performed solely to evaluate the change in decomposition gas concentrations over time, since there are no specific criteria applicable to the current monitoring program[5].

A total of 26 landfill gas sampling points were monitored during the Annual 2008 LTMP event. All FID readings were non-detectable. The 4-gas meter observations were as follows: O_2 results ranged from 17.9 to 20.9 percent, CO and H2S were not detected (0 ppm), and LEL results were all 0 percent. The landfill gas monitoring results are presented in Table 5-2.

[5] 6 NYCRR Part 360-2.17(f) states that the concentration of methane and other explosive (combustible) gases must not exceed: (i) 25 percent of the lower explosive limit (LEL) for gases in structures on- or off-site (*e.g.*, 1.25% for methane), and (ii) the LEL for gases at or beyond the property boundary (*e.g.*, 5% for methane). Pending (2006) revisions to 6 NYCRR Part 360 recodify Section 2.17(f) as new Subpart 363-10.1(g); the content of these proposed regulations do not differ from those currently in place.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions and recommendations concerning the Annual 2008 LTMP Event are presented below.

6.1 GROUND WATER

As with prior monitoring events, several Organic, Inorganic and Leachate Indicator Parameters were detected above the NYSDEC Ambient Water Quality Standards (AWQS) and Guidance Values during the 25,26 June 2008 monitoring event. However, most of these constituents have either been: (1) routinely detected in the up-gradient (background) monitoring well at similarly elevated concentrations, (2) detected sporadically as estimated (qualified) concentrations, (3) or attributed to the result of anaerobic dechlorination of low concentration solvent constituents within the landfill. The analytical results obtained for manganese in well MW-09 is somewhat higher than observed historically; ; however, no distinct trend has been observed relative to this constituent concentration, and elevated concentrations of leachate indicators are typically associated with MW-09, which is believed to lie within the path of a dilute plume emanating from the landfill. The concentration of vinyl chloride in MW-09 has increased slightly from the prior sampling period (although still below the prior maximum), and the concentration of ,2-dichloroethene has increased slightly (to a new maximum). Insufficient data are currently available to establish a trend for these constituents. The elevated concentration of 1,2-DCE in well MW-10 is uncharacteristic, but likely attributable to the well's proximity to well MW-09, which as noted above, typically exhibits the presence of solvent breakdown constituents at concentrations in excess of AWQS.

6.2 LANDFILL GAS

The sampling results show that the concentrations of decomposition gases measured around the periphery of the landfill have diminished over time. The results of the Annual 2008 Monitoring Event were consistent with those of the past several monitoring events, which generally indicate either non-detectable or sporadic and low-level concentrations of methaneand combustible gases.

7.0 PROJECT SCHEDULE AND DELIVERABLES

This Final Annual 2008 Long Term Monitoring Program (LTMP) Report represents the fourth project deliverable under Contract No. DAHA92-01-D-0006, Delivery Order No. 0088. The first three documents were represented by the Draft and Final Abbreviated Work Plans (AMEC 2008b, 12008c), and the Draft 2008 LTMP Report (AMEC, 2008d). The next scheduled project deliverable is the Draft Annual 2009 LTMP Report.

The 2009 LTMP sampling event is currently scheduled for the first quarter of 2009. The Period of Performance for Delivery Order No. 0088 expires on 22 June 2009.

8.0 REFERENCES

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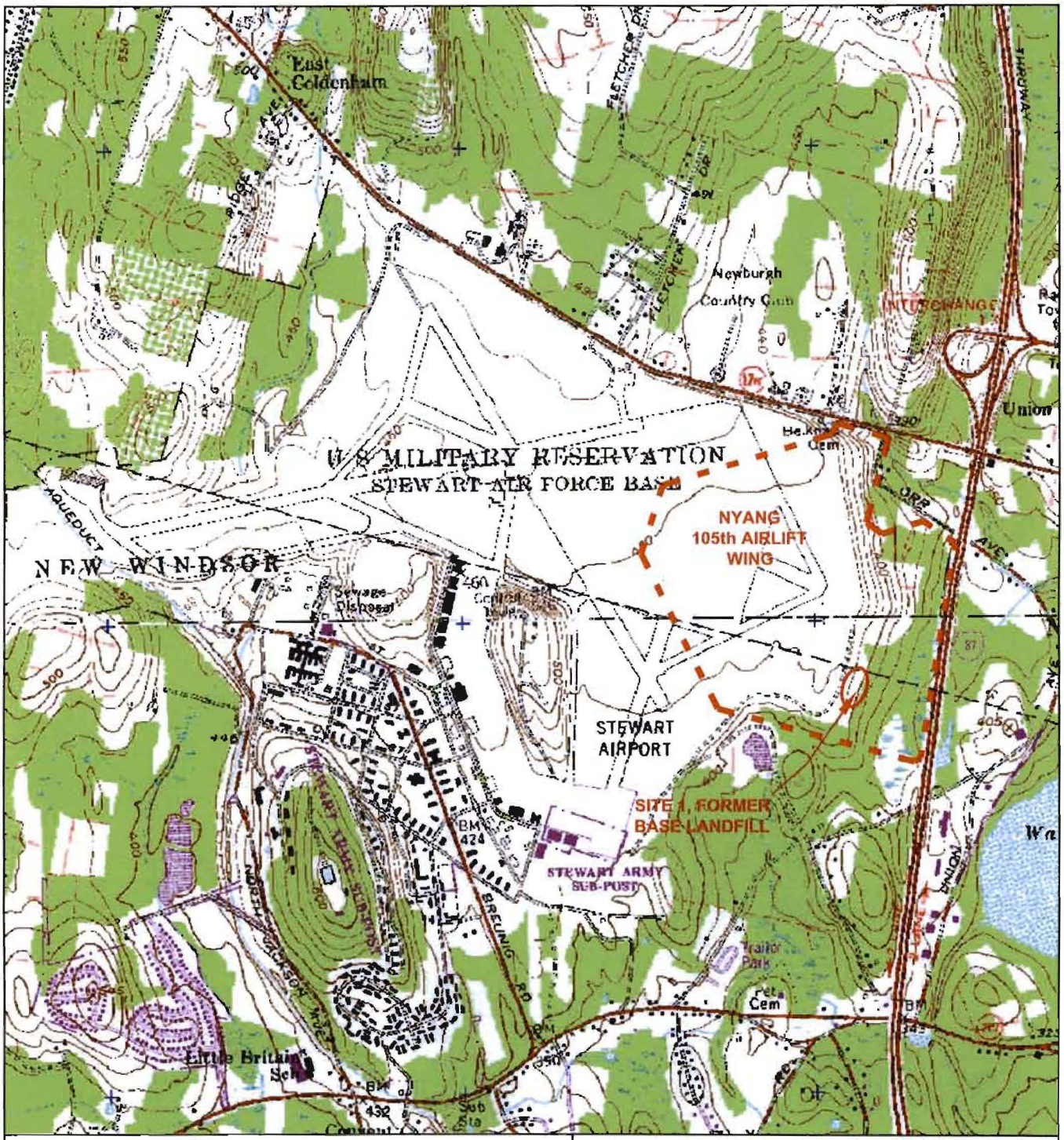
FIGURES



SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC SERIES
NEWBURGH QUADRANGLE, NY, 1951
CORNWALL–ON–HUDSON QUADRANGLE, NY, 1957

FIGURE 2-1

SITE LOCATION MAP

STEWART AIR NATIONAL GUARD BASE
NEWBURGH, NEW YORK

amec
EARTH & ENVIRONMENTAL, INC.
285 DAVIDSON AVENUE, SUITE 405
SOMERSET, NJ 08873-4153

0 200 400

APPROXIMATE SCALE IN FEET

N

SOURCE: NYS Statewide Digital Orthoimagery Program, Orange County, 2001

FIGURE 2-2

LOCATION MAP
SITE 1 FORMER BASE LANDFILL

STEWART AIR NATIONAL GUARD BASE
NEWBURGH, NEW YORK

amec
EARTH & ENVIRONMENTAL, INC.
285 DAVIDSON AVENUE, SUITE 405
SOMERSET, NJ 08873-4153

FIGURE 5-1

SITE 1 FORMER BASE LANDFILL

LTMP LANDFILL GAS AND MONITORING WELL LOCATIONS

STEWART AIR NATIONAL GUARD BASE
NEWBURGH, NEW YORK

amec
EARTH & ENVIRONMENTAL, INC.
285 DAVIDSON AVENUE, SUITE 405
SOMERSET, NJ 08873-4153

TABLES

TABLE 5-1
DETECTED CONSTITUENTS SUMMARY
LANDFILL GROUND WATER MONITORING RESULTS - ANNUAL 2008 LTMP SAMPLING EVENT
6 NYCRR PART 360 BASELINE PARAMETERS
Site 1 - Former Base Landfill, Stewart ANGS, Newburgh, New York

ANALYTES	Sample Date >	MW-04-01	MW-07-01	MW-07-02 [b]	MW-08-01	MW-09-01	MW-10-01	MW-11-01	TB-062508
	Laboratory ID >	6/26/2008	6/25/2008	6/25/2008	6/25/2008	6/25/2008	6/25/2008	6/26/2008	6/25/2008
		220-5646-8	220-5646-2	220-5646-3	220-5646-1	220-5646-6	220-5646-5	220-5646-9	220-5646-7TB
Inorganics	**NYSDEC AWQS [a] (ug/L)**	(ug/L)							
Alumimum	NA	500 U	500 U	500 U	500 U	500 U	230 J	1,200	
Antimony	3	20 U	20 U	20 U	20 U	20 U	20 U	20 U	
Arsenic	25	20 U	20 U	20 U	20 U	20 U	20 U	20 U	
Barium	1,000	4.1 J	6.7	7.0	13	86	34	14	
Beryllium	3	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	
Boron	1,000	61	21 J	21 J	31 J	82	49 J	8.0 J	
Cadmium	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Calcium	NA	80,400	131,000	130,000	75,200	180,000	113,000	160,000	
Chromium	50	2.5 J	10 U	10 U	10 U	10 U	10 U	2.5 J	
Cobalt	NA	10 U	10 U	10 U	10 U	2.7 J	10 U	10 U	
Copper	200	10 U	10 U	10 U	10 U	3.3 J	10 U	4.1 J	
Iron	300	280	200 U	200 U	200 U	200 U	***500***	***1,600***	
Lead	25	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Magnesium	35,000	13,800	22,700	23,000	9,200	26,300	15,500	16,700	
Manganese	300	***370***	15 U	15 U	15 U	***4,800***	***380***	69	
Mercury	0.7	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	
Nickel	100	10 U	10 U	10 U	10 U	4.8 J	10 U	1.6 J	
Potassium	NA	1,100	1,300	1,300	960	1,500	820	1,300	
Selenium	10	30 U	3.8 J	30 U	30 U	30 U	30 U	3.9 J	
Silver	50	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Sodium	20,000	***29,400***	***33,300***	***33,900***	7,000	***53,600***	***27,300***	16,500	
Thallium	0.5	30 U	30 U	30 U	30 U	30 U	30 U	30 U	
Vanadium	NA	5.0 U	1.3 J	1.3 J	5.0 U	5.0 U	5.0 U	3.1 J	
Zinc	2,000	50 U	50 U	50 U	50 U	10 J	50 U	15 J	
Leachate Indicators	**NYSDEC AWQS [a] (mg/L)**	(mg/L)							
Alkalinity	NA	178	404	409	201	570	331	429	
Ammonia	2	0.036 J	0.10 U	0.10 U	0.015 J	0.013 J	0.014 J	0.016 J	
Biochemical Oxygen Demand	NA	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.9 J	1.6 J	
Bromide	2	0.018 J	0.014 J	0.014 J	0.014 J	0.014 J	0.068 J	0.056 J	
Chemical Oxygen Demand	NA	10.0 U	10.0 U	10.0 U	2.5 J	3.8 J	10.0 U	5.7 J	
Chloride	250	2.5	38.7	38.6	3.4	83.4	32.7	50.9	
Chromium (hexavalent)	0.05	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.0037 J	
Color (Pt/Co)	NA	5.00	5.00 U	5.00 U	5.00	5.00	40.0	5.00	
Cyanide (total)	0.2	10 U	10 U	10 U	10 U	10 U	4.9 J	10 U	
Hardness as CaCO3	NA	258	421	419	226	558	346	468	
Nitrate	10	0.10 U	0.31	0.31	1.7	0.10 U	0.10 U	0.10 U	
Nitrogen (Kjeldahl)	NA	0.50 U	0.50 U	0.50 U	0.50 U	0.36 J	0.18 J	0.50 U	
Phenolics	0.001	0.0050 U	0.0050 U	0.0050 U	0.0050 U	***0.0062***	0.0020 J	0.0024 J	
Sulfate	250	140	51.9	52.2	15.1	37.0	22.0	24.9	
Total Dissolved Solids	NA	370	516	516	228	696	392	524	
Total Organic Carbon	NA	0.15 J	0.45 J	0.47 J	0.97 J	2.0	2.2	0.54 J	
Organic Parameters (c)	**NYSDEC AWQS [a] (ug/L)**	(ug/L)							
Chloromethane (Methyl Chloride)	5	1.9 J	5.0 U	5.0 U	5.0 U	2.1 J	2.3 J	2.0 J	2.3 J
Vinyl chloride	2	5.0 U	5.0 U	5.0 U	5.0 U	***24***	2.3 J	5.0 U	5.0 U
Methylene Chloride	5	5.0 U	0.73 J	5.0 U	5.0 U	0.40 J	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	5	5.0 U	5.0 U	5.0 U	5.0 U	***20***	***14***	5.0 U	5.0 U
Toluene	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	2.7 J	5.0 U
Xylene (m&p)	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.1 J	5.0 U

Detected constituents in **bold**
Constituents that exceed NYSDEC AWQS in ***bold/italic*** and highlighted

Notes:
[a] - NYSDEC Ambient Water Quality Standards and Guidance, TOGs 1.1.1 June 1998; amended January 1999, April 2000, AND June 2004
[b] - MW-7-02 is a duplicate sample of MW-07-01.
NA - No NYSDEC AWQS defined

Data Qualifiers
U - Analyzed for but not detected
J - Estimated value (organic parameters)
J - Sample result is greater than the MDL but below the CRDL (inorganics and leachate indicators)

TABLE 5-2
LANDFILL GAS MONITORING RESULTS - 1st ANNUAL SAMPLING EVENT
Site 1 - Former Base Landfill, Stewart ANGS, Newburgh, New York
Sample Date: 25 June, 2008

Monitoring Location	FID (ppm) [a]	4-Gas Meter [b]			
		O_2	CO	H_2S	LEL[c]
SV-01	0.0	20.1	0	0	0
SV-02	0.0	20.1	0	0	0
SV-03	0.0	20.1	0	0	0
SV-04	0.0	20.5	0	0	0
SV-05	0.0	20.5	0	0	0
SV-06	0.0	17.9	0	0	0
SV-07	0.0	20.3	0	0	0
SV-08	0.0	20.9	0	0	0
SV-09	0.0	20.7	0	0	0
SV-10	0.0	20.9	0	0	0
SV-11	0.0	20.4	0	0	0
SV-12	0.0	20.3	0	0	0
SV-13	0.0	20.1	0	0	0
SV-14	0.0	20.5	0	0	0
SV-15	0.0	20.5	0	0	0
SV-16	0.0	20.3	0	0	0
SV-17	0.0	18.8	0	0	0
SV-18	0.0	19.6	0	0	0
SV-19	0.0	19.6	0	0	0
SV-20	0.0	20.4	0	0	0
SV-21	0.0	20.3	0	0	0
SV-22	0.0	19.3	0	0	0
SV-23	0.0	20.2	0	0	0
SV-24	0.0	20.4	0	0	0
SV-25	0.0	20.2	0	0	0
SV-26	0.0	20.3	0	0	0

Notes:
[a]ppm = parts per million
[b] O_2 = Oxygen, CO = Carbon Monoxide, H_2S = Hydrogen Sulfide,
[c] LEL = Lower Explosive (flammable) Limit in air, % by volume; calibrated to methane

APPENDIX A
WELL PURGING AND SAMPLING LOGS

GROUNDWATER PURGING AND SAMPLING LOG

amec

Well ID: MW-4 Date: 6/26/2008

Project Name: Stewart AFB AMEC Project No.: 276220088

Project Location: Newburgh, NY Weather: Overcast, 70° F inter shower

Remarks: Sampler(s): MP/MJ

WELL PURGING:

PID Head Space Reading (ppm): 0

Depth to Water (ft bTOC): 31.34 Well Depth (ft bTOC): 58 Casing Stickup (ft): 2

Water Column (ft bTOC): 26.66 Water Column (gal.) 4.45 Casing Dia. (in): 2

Clear Bailer Survey: LNAPL: Y / N / **NA** DNAPL: Y / N / **NA**

Volume of Water to be Purged (gal) [3 volume method]: 13.35

Screen Interval (ft bgs): - Intake (ft bgs): 45

Purging Method: HB / PP / CP / **SP** Pumping Rate (gpm): 0.13

(HB=Hand Bailed, PP = Peristaltic Pump, CP = Centrifugal Pump, SP = Submersible Pump)

Pre-Purge Visual Appearance: **CLEAR** / SLIGHTLY TURBID / TURBID

in. (ft)	Gallons Water per Linear Ft
1 (0.083)	0.0408
2 (0.167)	0.1632
4 (0.333)	0.6528
6 (0.500)	1.4688

Alternate Calculation
(CD/2) x (CD/2) x 23.5 x WC
CD = Casing Dia. (ft)
WC = Water Column (ft)

WELL PURGE DATA: If 3 volume method: Start Time: End Time:

Actual Volume Purged (gal.):

Time	Temperature (°C / °F)	pH (units)	Conductivity (us/cm)	REDOX (Eh-mV)	DO (mg/l)	Turbidity (NTU)	COMMENTS (color, odor, change in pump rate, etc.)	
Start Time							Salinity	TDS
9:22	14.31	7.25	56.1	71	6.08	45.1	0.02	0.355
9:27	15.55	7.40	54.9	47	2.59	89.9	0.02	0.352
9:32	16.41	7.67	55.5	-25	0.91	166	0.02	0.356
9:42	16:50	8.10	56.1	-125	0.00	73.0	0.02	0.359
9:52	16.54	8.29	56.5	-133	0.00	20.2	0.02	0.361
10:02	16.73	8.34	56.9	-133	0.00	6.7	0.02	0.363
10:12	16.45	8.33	57.5	-132	0.00	4.0	0.02	0.368
10:22	17.03	8.36	57.8	-132	0.00	2.1	0.02	0.370

End Time: 10:50 Total Volume Purged (gal.): 8

Purged Dry: Y / **N** If Purged Dry, Recovery Rate (ft/min):

SAMPLING DATA: Sample Time (Start / End): 10:30/10:50

Depth to Water (ft): 34.2 Sampling Method: Bailer / **In-Line**

If 3 volume method, indicate sample chemistry data	Temperature (°C / °F)	pH (units)	Conductivity (us/cm)	REDOX (Eh-mV)	DO (mg/l)	Turbidity (NTU)

Sample Visual Appearance: **CLEAR** / SLIGHTLY TURBID / TURBID

Ferrous Iron (Fe^{2+}), ppm:

COMMENTS:
Sample collected - Sample ID: MW-04-01

AMEC Earth & Environmental, 285 Davidson Avenue, Suite 100, Somerset, NJ 08873 (732) 302-9500 / (732) 302-9504 (fax)

GROUNDWATER PURGING AND SAMPLING LOG

amec

Well ID: MW-7 Date: 6/25/2008

Project Name: Stewart AFB AMEC Project No.: 276220088

Project Location: Newburgh, NY Weather: Clear, 70° F

Remarks: Sampler(s): MP/MJ

WELL PURGING:

PID Head Space Reading (ppm): 0

Depth to Water (ft bTOC): 10.89 Well Depth (ft bTOC): 32.8 Casing Stickup (ft): 2

Water Column (ft bTOC): 21.91 Water Column (gal.) 3.58 Casing Dia. (in): 2

Clear Bailer Survey: LNAPL: Y / N / **NA** DNAPL: Y / N / **NA**

Volume of Water to be Purged (gal) [3 volume method]: 10.98

Screen Interval (ft bgs): - Intake (ft bgs):

Purging Method: HB / **PP** / CP / SP Pumping Rate (gpm): 0.15

(HB=Hand Bailed, PP = Peristaltic Pump, CP = Centrifugal Pump, SP = Submersible Pump)

Pre-Purge Visual Appearance: CLEAR / **SLIGHTLY TURBID** / TURBID

in. (ft)	Gallons Water per Linear Ft
1 (0.083)	0.0408
2 (0.167)	0.1632
4 (0.333)	0.6528
6 (0.500)	1.4688

Alternate Calculation
(CD/2) x (CD/2) x 23.5 x WC
CD = Casing Dia. (ft)
WC = Water Column (ft)

WELL PURGE DATA: If 3 volume method: Start Time: End Time:

Actual Volume Purged (gal.):

Time	Temperature (°C / °F)	pH (units)	Conductivity (us/cm)	REDOX (Eh-mV)	DO (mg/l)	Turbidity (NTU)	COMMENTS (color, odor, change in pump rate, etc.)	
Start Time							If 3 volume method, include Start Time chemistry data only	
11:30							Salinity	TDS
11:34	11.30	6.53	91.6	130	3.83	10.4	0.04	0.581
11:39	11.03	6.44	89.9	131	0.00	13.2	0.04	0.576
11:44	10.62	6.44	89.9	132	0.00	14.9	0.04	0.576
11:54	10.99	6.43	89.5	132	0.00	17.6	0.04	0.573
12:04	11.02	6.43	89.1	133	0.00	30.6	0.04	0.569
12:14	11.06	6.43	88.9	134	0.00	32.1	0.04	0.569
12:24	11.07	6.44	88.6	135	0.00	32.1	0.04	0.566
12:34	11.01	6.44	88.8	135	0.00	30.0	0.04	0.569

End Time: 12:35 Total Volume Purged (gal.): 9.0

Purged Dry: Y / **N** If Purged Dry, Recovery Rate (ft/min):

SAMPLING DATA: Sample Time (Start / End): 12:35/12:45

Depth to Water (ft): 12.8 Sampling Method: Bailer / **In-Line**

If 3 volume method, indicate sample chemistry data	Temperature (°C / °F)	pH (units)	Conductivity (us/cm)	REDOX (Eh-mV)	DO (mg/l)	Turbidity (NTU)

Sample Visual Appearance: **CLEAR** / SLIGHTLY TURBID / TURBID

Ferrous Iron (Fe^{2+}), ppm:

COMMENTS:
Sample collection: MW-07-01
MW-07-02 and MW-07-03 (MS and MSD)

GROUNDWATER PURGING AND SAMPLING LOG

amec

Well ID: MW-8 Date: 6/25/2008

Project Name: Stewart AFB AMEC Project No.: 276220088

Project Location: Newburgh, NY Weather: Clear, 70° F

Remarks: Sampler(s): MP/MJ

WELL PURGING: PID Head Space Reading (ppm): 0

Depth to Water (ft bTOC): 10.46 Well Depth (ft bTOC): 19.20 Casing Stickup (ft): 3.1

Water Column (ft bTOC): 8.74 Water Column (gal.) 1.43 Casing Dia. (in): 2

Clear Bailer Survey: LNAPL: Y / N / **NA** DNAPL: Y / N / **NA**

Volume of Water to be Purged (gal) [3 volume method]: 4.28

Screen Interval (ft bgs): - Intake (ft bgs):

Purging Method: HB / **PP** / CP / SP Pumping Rate (gpm): 0.10

(HB=Hand Bailed, PP = Peristaltic Pump, CP = Centrifugal Pump, SP = Submersible Pump)

Pre-Purge Visual Appearance: **CLEAR** / SLIGHTLY TURBID / TURBID

in. (ft)	Gallons Water per Linear Ft
1 (0.083)	0.0408
2 (0.167)	0.1632
4 (0.333)	0.6528
6 (0.500)	1.4688

Alternate Calculation
(CD/2) x (CD/2) x 23.5 x WC
CD = Casing Dia. (ft)
WC = Water Column (ft)

WELL PURGE DATA: If 3 volume method: Start Time: End Time:

Actual Volume Purged (gal.):

Time	Temperature (°C / °F)	pH (units)	Conductivity (us/cm)	REDOX (Eh-mV)	DO (mg/l)	Turbidity (NTU)	COMMENTS (color, odor, change in pump rate, etc.)	
Start Time							If 3 volume method, include Start Time chemistry data only	
							Salinity	TDS
10:13	12:18	6.34	37.6	84	7.80	57.4	0.01	0.243
10:18	11.89	6.48	39.4	99	4.77	6.2	0.02	0.255
10:23	12.06	6.51	40.3	101	4.53	2.6	0.02	0.264
10:33	11.67	6.54	41.6	110	3.97	0.0	0.02	0.370
10:43	11.74	6.52	42.8	117	3.67	0.0	0.02	0.279
10:53	11.79	6.56	41.8	121	3.67	0.0	0.02	0.272
11:03	11.88	6.57	42.0	121	3.65	0.0	0.02	0.273

End Time: 11:25 Total Volume Purged (gal.): 5.0

Purged Dry: **Y** / N If Purged Dry, Recovery Rate (ft/min):

SAMPLING DATA: Sample Time (Start / End): 11:05/11:25

Depth to Water (ft): 13.8 Sampling Method: Bailer / **In-Line**

If 3 volume method, indicate sample chemistry data	Temperature (°C / °F)	pH (units)	Conductivity (us/cm)	REDOX (Eh-mV)	DO (mg/l)	Turbidity (NTU)

Sample Visual Appearance: **CLEAR** / SLIGHTLY TURBID / TURBID

Ferrous Iron (Fe^{2+}), ppm:

COMMENTS:
Sample ID: MW-08-01

GROUNDWATER PURGING AND SAMPLING LOG

amec

Well ID: MW-9 Date: 6/25/2008

Project Name: Stewart AFB AMEC Project No.: 276220088

Project Location: Newburgh, NY Weather: Clear, 70° F

Remarks: Sampler(s): MP/MJ

WELL PURGING: PID Head Space Reading (ppm): 0

Depth to Water (ft bTOC): 11.25 Well Depth (ft bTOC): 25 Casing Stickup (ft): 2.95

Water Column (ft bTOC): 13.75 Water Column (gal.) 2.3 Casing Dia. (in): 2

Clear Bailer Survey: LNAPL: Y / N / **NA** DNAPL: Y / N / **NA**

Volume of Water to be Purged (gal) [3 volume method]: 6.9

Screen Interval (ft bgs): - Intake (ft bgs):

Purging Method: HB / **PP** / CP / SP Pumping Rate (gpm): 0.19

(HB=Hand Bailed, PP = Peristaltic Pump, CP = Centrifugal Pump, SP = Submersible Pump)

Pre-Purge Visual Appearance: **CLEAR** / SLIGHTLY TURBID / TURBID

in. (ft)	Gallons Water per Linear Ft
1 (0.083)	0.0408
2 (0.167)	0.1632
4 (0.333)	0.6528
6 (0.500)	1.4688

Alternate Calculation
(CD/2) x (CD/2) x 23.5 x WC
CD = Casing Dia. (ft)
WC = Water Column (ft)

WELL PURGE DATA: If 3 volume method: Start Time: End Time:

Actual Volume Purged (gal.):

Time	Temperature (°C / °F)	pH (units)	Conductivity (us/cm)	REDOX (Eh-mV)	DO (mg/l)	Turbidity (NTU)	COMMENTS (color, odor, change in pump rate, etc.)	
Start Time 14:49							If 3 volume method, include Start Time chemistry data only	
							Salinity	TDS
14:53	12.41	6.65	0.116	78	4.63	25.6	0.05	0.73
14:58	11.53	6.43	0.114	85	0.46	2.0	0.05	0.74
15:03	11.50	6.38	0.117	88	0.03	5.1	0.05	0.75
15:13	11.21	6.38	0.117	79	0.00	8.8	0.05	0.75
15:23	11.21	6.38	0.116	78	0.00	24.0	0.05	0.74
15:33	11.03	6.39	0.116	74	0.00	33.1	0.05	0.75
15:43	11.03	6.39	0.116	72	0.00	31.2	0.05	0.75

End Time: 15:56 Total Volume Purged (gal.): 9.5

Purged Dry: Y / **N** If Purged Dry, Recovery Rate (ft/min):

SAMPLING DATA: Sample Time (Start / End): 15:45/15:56

Depth to Water (ft): 13.8 Sampling Method: Bailer / **In-Line**

If 3 volume method, indicate sample chemistry data	Temperature (°C / °F)	pH (units)	Conductivity (us/cm)	REDOX (Eh-mV)	DO (mg/l)	Turbidity (NTU)

Sample Visual Appearance: **CLEAR** / SLIGHTLY TURBID / TURBID

Ferrous Iron (Fe^{2+}), ppm:

COMMENTS:
Sample ID: MW-09-09-01

AMEC Earth & Environmental, 285 Davidson Avenue, Suite 100, Somerset, NJ 08873 (732) 302-9500 / (732) 302-9504 (fax)

GROUNDWATER PURGING AND SAMPLING LOG

amec

Well ID: MW-10 Date: 6/25/2008

Project Name: Stewart AFB AMEC Project No.: 276220088. 0003

Project Location: Newburgh, NY Weather: Sunny, 50 to 70° F

Remarks: Sampler(s): MP/MJ

WELL PURGING: PID Head Space Reading (ppm): 0

Depth to Water (ft bTOC): 7.13 Well Depth (ft bTOC): 11.85 Casing Stickup (ft): 2.4

Water Column (ft bTOC): 4.72 Water Column (gal.) 0.788 Casing Dia. (in): 2

Clear Bailer Survey: LNAPL: Y / N / **NA** DNAPL: Y / N / **NA**

Volume of Water to be Purged (gal) [3 volume method]: 2.364

Screen Interval (ft bgs): - Intake (ft bgs):

Purging Method: HB / **PP** / CP / SP Pumping Rate (gpm): 0.10

(HB=Hand Bailed, PP = Peristaltic Pump, CP = Centrifugal Pump, SP = Submersible Pump)

Pre-Purge Visual Appearance: CLEAR / **SLIGHTLY TURBID** / TURBID

in. (ft)	Gallons Water per Linear Ft
1 (0.083)	0.0408
2 (0.167)	0.1632
4 (0.333)	0.6528
6 (0.500)	1.4688

Alternate Calculation
(CD/2) x (CD/2) x 23.5 x WC
CD = Casing Dia. (ft)
WC = Water Column (ft)

WELL PURGE DATA: If 3 volume method: Start Time: End Time:

Actual Volume Purged (gal.):

Time	Temperature (°C / °F)	pH (units)	Conductivity (us/cm)	REDOX (Eh-mV)	DO (mg/l)	Turbidity (NTU)	COMMENTS (color, odor, change in pump rate, etc.)	
Start Time 13:47							If 3 volume method, include Start Time chemistry data only	
							Salinity	TDS
13:51	14.36	6.72	65.7	117	6.26	171	0.03	0.405
13:56	14.82	6.56	56.7	122	5.37	18.4	0.02	0.364
14:01	14.58	6.53	57.9	126	4.72	10.2	0.02	0.372
14:11	14.34	6.50	66.9	129	2.29	5.6	0.03	0.431
14:21	14.21	6.49	68.8	129	1.23	0.0	0.03	0.441
14:31	13.62	6.48	69.5	129	1.14	2.0	0.03	0.441

End Time: 14:45 Total Volume Purged (gal.): 4.0

Purged Dry: Y / **N** If Purged Dry, Recovery Rate (ft/min):

SAMPLING DATA: Sample Time (Start / End): 14:35/14:45

Depth to Water (ft): 11.07 Sampling Method: Bailer / **In-Line**

If 3 volume method, indicate sample chemistry data	Temperature (°C / °F)	pH (units)	Conductivity (us/cm)	REDOX (Eh-mV)	DO (mg/l)	Turbidity (NTU)

Sample Visual Appearance: CLEAR / **SLIGHTLY TURBID** / TURBID

Ferrous Iron (Fe^{2+}), ppm:

COMMENTS:
Sample ID: MW-10-01

GROUNDWATER PURGING AND SAMPLING LOG

amec

Well ID: MW-11 Date: 6/26/2008

Project Name: Stewart AFB AMEC Project No.: 276220088

Project Location: Newburgh, NY Weather: Overcast, Scattered shower,

Remarks: Sampler(s): MP/MJ

WELL PURGING: PID Head Space Reading (ppm): 0

Depth to Water (ft bTOC): 16.61 Well Depth (ft bTOC): 29.55 Casing Stickup (ft): 2.90

Water Column (ft bTOC): 12.94 Water Column (gal.) 2.16 Casing Dia. (in): 2

Clear Bailer Survey: LNAPL: Y / N / **NA** DNAPL: Y / N / **NA**

Volume of Water to be Purged (gal) [3 volume method]: 6.48

Screen Interval (ft bgs): - Intake (ft bgs):

Purging Method: HB / **PP** / CP / SP Pumping Rate (gpm): 0.05

(HB=Hand Bailed, PP = Peristaltic Pump, CP = Centrifugal Pump, SP = Submersible Pump)

Pre-Purge Visual Appearance: **CLEAR** / SLIGHTLY TURBID / TURBID

in. (ft)	Gallons Water per Linear Ft
1 (0.083)	0.0408
2 (0.167)	0.1632
4 (0.333)	0.6528
6 (0.500)	1.4688

Alternate Calculation
(CD/2) x (CD/2) x 23.5 x WC
CD = Casing Dia. (ft)
WC = Water Column (ft)

WELL PURGE DATA: If 3 volume method: Start Time: End Time:

Actual Volume Purged (gal.):

Time	Temperature (°C / °F)	pH (units)	Conductivity (us/cm)	REDOX (Eh-mV)	DO (mg/l)	Turbidity (NTU)	COMMENTS (color, odor, change in pump rate, etc.)	
Start Time 11:27							If 3 volume method, include Start Time chemistry data only	
							Salinity	TDS
11:39	16.41	6.76	90.7	103	5.91	18.1	0.04	0.579
11:44	16.25	6.64	90.6	105	8.63	13.9	0.04	0.580
11:49	15.00	6.55	906	112	8.23	68	0.04	0.579
11:59	16.28	7.22	88.8	101	9.27	95.1	0.04	0.566
12:09	16.10	7.44	88.9	98	9.56	92.1	0.04	0.566
12:19	16.30	7.77	87.8	96	9.34	13.8	0.04	0.566

End Time: 12:40 Total Volume Purged (gal.): 2

Purged Dry: **Y** / N If Purged Dry, Recovery Rate (ft/min):

SAMPLING DATA: Sample Time (Start / End): 12:36

Depth to Water (ft): 26.59 Sampling Method: Bailer / **In-Line**

If 3 volume method, indicate sample chemistry data	Temperature (°C / °F)	pH (units)	Conductivity (us/cm)	REDOX (Eh-mV)	DO (mg/l)	Turbidity (NTU)

Sample Visual Appearance: **CLEAR** / SLIGHTLY TURBID / TURBID

Ferrous Iron (Fe^{2+}), ppm:

COMMENTS: Slow purging due to low recharge
Sample ID: MW-11-01

APPENDIX B
LABORATORY ANALYTICAL DATA PACKAGES (CD-ROM)
STL-NEWBURGH