Dump Road Supplemental Design Characterization Report Martin State Airport Middle River, Maryland

Prepared f	or:
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Lockheed Martin Corporation

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ACRONYMS

ASTM American Society for Testing and Materials
BTEX benzene, toluene, ethylbenzene, and xylenes

cis-1,2-DCE cis-1,2-dichloroethene

cVOC chlorinated volatile organic compounds

EM electromagnetic

ERA ecological risk assessment

FS feasibility study ft/day feet per day

GPS global positioning system HASP health and safety plan

HHRA human health risk assessment

IDW investigation-derived waste

Lockheed Martin Corporation

MAA Maryland Aviation Administration

MANG Maryland Air National Guard

MDE Maryland Department of the Environment

MSA Martin State Airport

μg microgram

μg/L micrograms per liter (i.e., parts per billion)

NAD83 North American Datum of 1983

NAVD88 North American Vertical Datum of 1988

PCBs polychlorinated biphenyls RI remedial investigation

SVOC semivolatile organic compounds

TCE trichloroethene
Tetra Tech Tetra Tech, Inc.

TPH total petroleum hydrocarbons

USACE United States Army Corps of Engineers

USEPA United States Environmental Protection Agency

VC vinyl chloride

VOC volatile organic compounds

Executive Summary

On behalf of Lockheed Martin Corporation, Tetra Tech, Inc. (Tetra Tech) conducted a supplemental study at the Dump Road Area of Martin State Airport (MSA), Middle River, Maryland from June-October, 2010 to fill data gaps and provide additional information to complete a remedial design to restore soil and groundwater. Tetra Tech conducted the following supplemental activities at the Dump Road Area:

- a topographical survey of the Dump Road Area
- a wetland survey to identify and map biological resources at the Dump Road Area
- a passive soil-gas survey to assess contaminants in the shallow subsurface soil adjacent to Taxiway Tango and the airport runway
- single-well permeability tests (i.e., slug tests) to provide data on the hydraulic characteristics of the surficial-aquifer
- long-term monitoring of groundwater levels in three Dump Road Area wells in conjunction with off-site groundwater and surface water level monitoring
- a geophysical survey to delineate the horizontal boundaries of manmade fill areas
- a round of synoptic groundwater levels from the MSA wells
- additional groundwater-flow and solute-transport modeling of the Dump Road Area using data from the supplemental study

The results of the wetlands delineation, long-term surface water-level and groundwater-level monitoring, and groundwater modeling update are provided in separate documents and are not repeated in this report. A new round of groundwater samples and three surface water samples from Frog Mortar Creek were also collected in July 2010 for laboratory and field chemical analyses. Details of the sampling methods and chemical results are provided in the *Draft Final Groundwater Monitoring Report*.

The following summarizes the results of 2010 supplemental activities:

- Site topography for the Dump Road Area ranges from flat to gently sloping to the northeast (toward Frog Mortar Creek). In the northern portion of the Dump Road Area, land elevations range from approximately 11 feet above NAVD88 near the runway to approximately seven feet above NAVD88 at Pond No. 2. In the southeastern portion of the site, land elevations are approximately 20 feet above NAVD88 at a mounded area near the embankment, near Frog Mortar Creek. A steep embankment runs along the Frog Mortar Creek shoreline and along the northern edge of the wetlands.
- Ninety-nine passive soil-gas samples were analyzed for volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), and diesel alkanes. Trichloroethene (TCE) and cis-1,2-dichloroethene (cis-1,2-DCE) were detected northwest of well MW33S and, to a lesser degree, northwest of well DMW11S. Maximum TCE and cis-1,2-DCE soil-gas masses of 51.51 micrograms (μg) and 73.12 μg, respectively, were reported at a sampling location approximately 180 feet northwest of well MW33S. TCE was also detected at sampling locations on the western side of Taxiway Tango. Petroleum-related VOCs (benzene, toluene, ethylebenzene, and xylenes), naphthalene/2-methylnaphthalene, and TPH have soil-gas-mass distributions similar to the VOCs. The relative benzene/xylenes/TPH masses in the passive soil-gas samples indicate that the source of the contamination is either a weathered gasoline or a heavier petroleum product, such as diesel or jet fuel.
- Based on the results of the slug test analyses, the range of hydraulic conductivities for the lower surficial-aquifer wells is 2.74 ft/day at MW18D to 25.5 ft/day at MW15D. The geometric mean of the lower surficial-aquifer tests, excluding MW17D and MW26D (both set in clay), is 8.4 ft/day (arithmetic mean is 11.3 ft/day). A comparison of the 2003 and 2010 slug test results for wells DMW7I and DMW8D indicate that the solid slug and pneumatic slug test methods provide comparable results (i.e., same order of magnitude estimates).
- The geophysical survey identified four geophysical anomalies (i.e., areas of elevated instrument responses). They were identified as either a possible utility vault, as soil containing more clay minerals, or as saturated mineral-rich soil associated with wetlands. Metal objects were not associated with the anomalies. Metallic debris was found scattered across the ground in one small area in the northwestern corner of the survey area. It is recommended that EM anomalies A–D and the smaller EM anomalies in the northwestern corner of the survey area be excavated using test pits to verify the presence or absence of buried materials at these locations.
- Groundwater in the upper, intermediate, and lower surficial-aquifer zones flow northeast toward Frog Mortar Creek. Groundwater in the deep confined-aquifer flows northwest to southeast.

Section 1 Introduction

On behalf of Lockheed Martin Corporation (Lockheed Martin), Tetra Tech, Inc. (Tetra Tech) has prepared the following report documenting a June–October 2010 supplemental site investigation as part of the Dump Road design characterization at Martin State Airport (MSA) in Middle River, Maryland. Figures 1-1 and 1-2 depict the location and layout of MSA. As shown in these figures, the area referred to as the Dump Road Area is along the northeast side of the airport runway. A portion of the area extends across Taxiway Tango into the median between the taxiway and runway.

A remedial investigation (RI) in early 2010 (Tetra Tech, 2010a) evaluated the nature and extent of soil, pond sediment, and groundwater contamination and assessed the fate and transport of contaminants in soil and groundwater. It also includes a human health risk assessment (HHRA) and an ecological risk assessment (ERA). The RI is based on physical and chemical data collected from 2000–2009 and groundwater chemical data collected from 2007–2009. Groundwater modeling was also performed in support of a groundwater feasibility study (FS) for the Dump Road Area.

Chemical analyses of numerous soil and pond-sediment samples indicate volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and several metals in Dump Road Area soil and pond-bottom sediments at concentrations exceeding U.S. Environmental Protection Agency (USEPA) human health and ecological risk-based screening levels and Maryland Department of the Environment (MDE) soil cleanup standards. Concentrations of chlorinated VOCs (cVOCs) [such as trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride (VC)] exceed federal and Maryland groundwater standards throughout a large portion of the investigation area and at multiple depths in the surficial aquifer.

This supplemental investigation fills data gaps identified as part of the Dump Road Area RI and FS and provides information required for the remedial design. The objectives of this supplemental investigation are to:

- provide additional chemical characterization of near-surface soil and groundwater cVOC distributions on the western and northwestern boundaries of the Dump Road Area
- provide data to evaluate the hydrogeologic interactions between the surficial aquifer and Frog Mortar Creek
- provide data required for the design of groundwater and soil remedies and for the associated permit application that will be submitted to MDE, Baltimore County, the U.S. Army Corps of Engineers (USACE), and the Chesapeake Bay Critical Area Commission

This investigation's objectives were addressed by the following activities:

- obtained [from Lockheed Martin, MSA, and the Maryland Aviation Administration (MAA)] utility clearances, an access agreement, and associated permits for intrusive investigations
- a topographical survey of the Dump Road Area from the eastern side of Taxiway Tango to the western shoreline of Frog Mortar Creek to generate a map with a scale of one-inch to 100-feet reproducible plot and one-foot contours
- a wetland survey to identify and map biological resources in accordance with requirements of the "Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Non-Tidal Wetland in Maryland"
- a passive soil-gas survey to assess cVOCs in the shallow subsurface soil and groundwater adjacent to Taxiway Tango and the airport runway
- single-well permeability tests (i.e., slug tests) to provide additional data on the hydraulic characteristics of the lower surficial-aquifer zone
- long-term monitoring of groundwater levels in three Dump Road Area wells in conjunction with off-site groundwater and surface water level monitoring at Conrad's Ruth Villa and Parkside Marina, on the eastern shoreline of Frog Mortar Creek
- a geophysical survey using electromagnetic (EM)-31/61 and other methods east of Taxiway Tango, near its southern end, to delineate the horizontal boundaries of possible manmade fill areas surrounding the tidal inlet and wetlands north of the airport's compass rose (i.e., circular concrete apron located in the southeastern end of MSA)
- a round of synoptic groundwater levels from the MSA wells

• additional groundwater flow and solute-transport modeling of the Dump Road Area using the results of the slug tests and long-term water level monitoring from this study

Additionally, a new round of groundwater samples and three surface water samples from Frog Mortar Creek were also collected in July 2010 for laboratory and field chemical analyses. Details of the sampling methods and chemical results are provided in the *Draft Final Groundwater Monitoring Report* (Tetra Tech, 2010b).

This report is organized as follows:

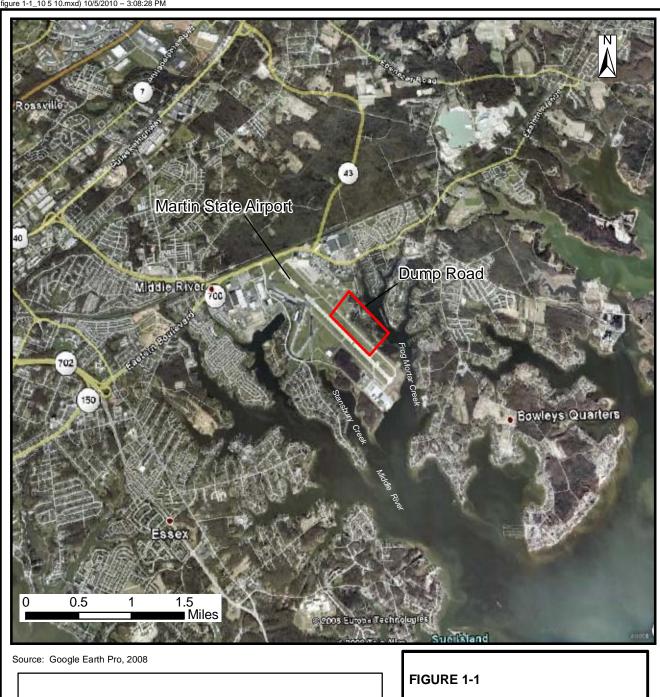
<u>Section 2— Site Background</u>: Describes where detailed background descriptions of the site and previous investigations can be found

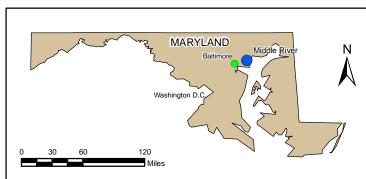
<u>Section 3— Investigation Approach and Field Methodology</u>: Presents the technical approach to the investigation and the field methodologies used

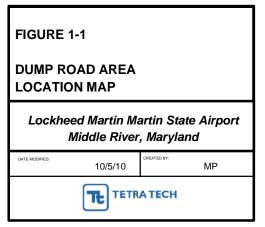
<u>Section 4— Investigation Results</u>: Presents the results of the field program

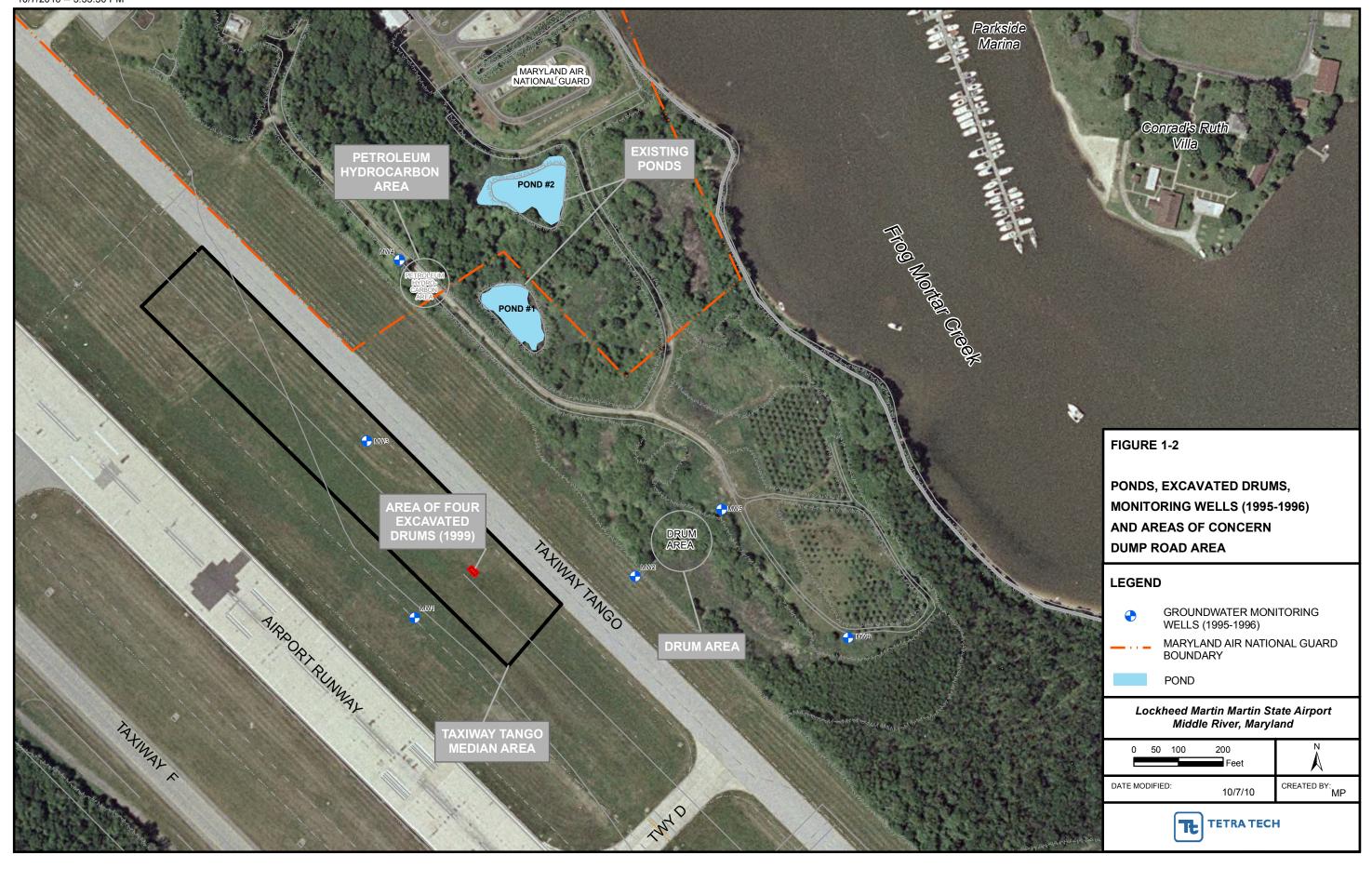
<u>Section 5— Summary</u>: Summarizes the investigation findings

<u>Section 6— References</u>: Cites references used to compile the report









Section 2 Site Background

Environmental investigations of the MSA Dump Road Area began in 1989 when MDE conducted a preliminary assessment of MSA. During the 1930s and 1950s, the Glenn L. Martin Aircraft Company reportedly used a sand pit under the current Taxiway Tango to dump spent battery-acid, acid-type strippers, and other acidic solutions, in addition to dredge spoils and construction debris. However, USEPA concluded after a review of the preliminary assessment that no signs of waste disposal were apparent, and the site was classified as "No Further Remedial Action Planned."

In July 1991, four drums containing dried zinc-chromate paint were uncovered during installation of underground electric cables adjacent to Taxiway Tango, prompting MDE to order additional studies. MAA and Lockheed Martin (a successor firm of the Glenn L. Martin Aircraft Company) conducted additional studies from 1991–1999, including geophysical surveys to locate and identify buried materials, and sampling and chemical analyses of soil, groundwater, surface water, and sediment. These initial investigations identified four areas of concern known as the Taxiway Tango Median Anomaly Area, the Drum Area, two ponds (Pond 1 and Pond 2), and the Petroleum Hydrocarbon Area (see Figure 1-2).

Lockheed Martin conducted an RI from 2000–2009 to further delineate the extent of soil, groundwater, and sediment chemical-contamination indicated by the earlier studies (Tetra Tech, 2010a). Through geophysical surveys, test pits, soil borings, and soil sample chemical analyses, the RI identified surface and subsurface soil contamination from buried fill material. The fill material consists of soil, stained soil, and debris, the latter of which is comprised of concrete rubble and disposed industrial items (e.g., batteries, decomposed drums, tires, paint cans, burnt items, sludge, buckets, glass, wood, etc.). Complete details of the site background, including previous investigations, descriptions of site geology and hydrogeology, and current conditions are provided in the RI (Tetra Tech, 2010a) and are not repeated here.

Investigation Approach and Field Methodology

The following activities were conducted from June-October, 2010 to address additional data needs to support a remedial design for soil and groundwater at the Dump Road Area:

- obtained (from Lockheed Martin, MSA, and MAA) utility clearances, an access agreement, and associated permits for intrusive investigations
- a topographical survey of the Dump Road Area from the eastern side of Taxiway Tango to the western shoreline of Frog Mortar Creek to generate a map with a scale 1-inch to 70-feet reproducible plot and 1-foot contours
- a wetland survey to identify and map biological resources in accordance with the requirements of the "Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Non-Tidal Wetland in Maryland"
- a passive soil-gas survey to assess cVOCs in the shallow subsurface soil adjacent to Taxiway Tango and the airport runway
- single-well permeability tests (i.e., slug tests) to provide additional data on the hydraulic characteristics of the lower surficial-aquifer zone
- long-term monitoring of groundwater levels in three Dump Road Area wells in conjunction with off-site groundwater and surface water level monitoring at Conrad's Ruth Villa and Parkside Marina, on the eastern shoreline of Frog Mortar Creek
- a geophysical survey, using EM-31/61 and other methods, east of Taxiway Tango near its southern end, to delineate the horizontal boundaries of manmade fill areas surrounding the tidal inlet and wetlands north of the airport's compass rose
- a round of synoptic groundwater levels from MSA wells,
- additional groundwater-flow and solute-transport modeling of the Dump Road Area using the slug tests and long-term water level monitoring results from this study

Methods used to complete these tasks are described below.

3.1 MOBILIZATION/DEMOBILIZATION

Following approval of the *Supplemental Investigation Work Plan* (Tetra Tech, 2010c), Tetra Tech procured the required subcontractors and mobilized to the field. Mobilization included:

- coordinating with Lockheed Martin and MSA facilities personnel
- obtaining utility clearances for the passive soil-gas boring locations using a private firm, as described in section 3.1.2
- mobilizing subcontractors, equipment, and materials to the site
- implementing a site-specific health and safety plan (HASP)
- arranging a decontamination area
- managing investigation-derived waste (IDW)

Demobilization activities included the following activities:

- demobilizing equipment and materials from the site
- general site clean-up and trash removal
- repairing landscaping (as necessary)
- managing IDW

The field operations leader coordinated mobilization and demobilization, including equipment inventories to ensure that equipment was available, purchasing and leasing equipment, and staging equipment for efficient loading and transport to and from the site before and after each field activity.

Before field operations began, Tetra Tech personnel reviewed the site-specific HASP and the respective "Safe Work Permits" included in the HASP. Tetra Tech conducted a mandatory, daily, health and safety tailgate meeting before all field events. Subcontractors present for that day's field activities were included in the meeting. The Tetra Tech site health and safety officer documented pertinent topics covered and personnel in attendance.

3.2 SITE ACCESS, PERMITS AND UTILITY CLEARANCE

Tetra Tech obtained the required permits and conducted subsurface-utility screening and marking in the drilling areas before sampling soil-gas. Notifications, clearances, and permits include the following:

- notifying the regional underground-utility location center Miss Utility (1-800-257-7777; www.missutility.net)
- reviewing facility/site utility maps
- completing a corporate staff procedure CS-28, "Digging Project," form and obtaining the required signatures
- completing and executing the "Airport Zoning Permit," "Building Inspection" form, and "Digging Authorization" permit through MAA
- contacting the Maryland Air National Guard (MANG) and receiving approval based on MANG operational schedules
- obtaining digging permits through MSA and/or Baltimore/Washington International Airport administrations
- contracting a private utility-locating firm (Enviroscan, Inc.) to identify and mark any subsurface utilities or geophysical anomalies (i.e., possible subsurface obstacles or utilities)

Each soil-gas probe location was cleared for subsurface utilities. In addition to calling in a Miss Utility ticket, a private utility-locating service, Enviroscan, Inc., was contracted to mark any underground utilities and subsurface geophysical anomalies. The private utility-locating firm used typical utility locating equipment representing the best available technology, including a Fisher TW-6 electromagnetic pipe and cable locator/tracer, a Radiodetection C.A.T. and genny pipe and cable locator/tracer, a Radiodetection model RD4000 multi-frequency pipe and cable tracer, and a GSSI SIR-2000 ground-penetrating radar (GPR) system. All utilities within a 30-foot radius of each designated location were located and marked with paint on the ground surface.

Tetra Tech coordinated access arrangements through MSA Operations to gain access to the work area at Dump Road through Gate 12. Tetra Tech obtained a key from MSA Operations to access the gated entrance. Tetra Tech also used a radio to maintain constant contact with the MSA air

traffic control tower while working in the taxiway and runway areas. Permits, the Miss Utility clearance, and the Enviroscan utility-screening report are included in Appendix A.

3.3 TOPOGRAPHIC MAPPING

Murphy Geomatics, Inc. of Raleigh, North Carolina conducted a topographic survey of the Dump Road Area from the eastern side of Taxiway Tango to the western shoreline of Frog Mortar Creek. The northern limit of the survey was near the access to the MANG Jet Engine Test Pad from Taxiway Tango. The southern limit was south of the airport compass rose. Figure 3-1 shows the topographic survey area.

Two topographical survey maps were prepared using a 1:70 scale and a one-foot topographic-contour interval based on the North American Vertical Datum of 1988 (NAVD88). Horizontal coordinates (i.e., northing and easting coordinates) are based on the Maryland state plane-system, North American Datum of 1983. The surveying firm prepared computer-generated drawing files in AutoCADTM 2007 format. Entries were placed on drawing layers named to describe the entity being mapped. Elevation information in the $AutoCAD^{TM}$ file was provided in a three-dimensional format. A digital terrain-model $AutoCAD^{TM}$ file containing three-dimensional points and break lines was submitted. Two permanent benchmarks were established at the Dump Road Area site. The survey maps are provided in Appendix B.

3.4 WETLAND IDENTIFICATION AND MAPPING

Wetlands were identified and mapped on August 2–5 and 9, 2010 for approximately 88 acres in the Dump Road Area. Mapping included areas east of Taxiway Tango to the Frog Mortar Creek shoreline, from the point of access, to the MANG Jet Engine Test Pad, to south of the airport compass rose. Figure 3-1 shows the wetland survey area.

Wetlands were identified and mapped in accordance with the requirements of Section 404 of the federal *Clean Water Act* and the "Joint Federal/State Application for the Alteration of Any Floodplain, Waterway, Tidal or Non-tidal Wetland in Maryland." A desktop survey of the delineation area was conducted before field activities to locate possible wetlands and other waters in the project area. Tetra Tech reviewed a site layout map, as well as relevant data from the U.S. Fish and Wildlife Service National Wetland Inventory, the U.S. Geological Survey, the Maryland Department of Natural Resources, and Federal Emergency Management Agency. Tetra

Tech wetland specialists identified possible wetland areas and waters of the United States based on a review of aerial imagery and the data referenced above.

After completing the aerial imagery and data reviews, Tetra Tech conducted a routine delineation of wetlands and other waters of the United States to determine on-site jurisdictional wetlands. Wetlands were delineated in the field using the methods described in the *USACE Wetland Delineation Manual* (Environmental Laboratory, 1987) and the *Interim Regional Supplement* to the *USACE Wetland Delineation Manual*: Atlantic and Gulf Coastal Region (USACE, 2008). The 1987 manual defines wetlands as: "those areas that are inundated or saturated by surface or groundwater at a frequency and duration to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Under normal circumstances, three main criteria must be evaluated to determine if an area is a wetland: hydric soils, the presence of sustained wetland hydrology, and a dominance of hydrophytic vegetation. Areas satisfying all three criteria (except for identified "problem areas" or "atypical situations") and meeting the specific criteria as outlined in the *Atlantic and Gulf Coastal Regional Supplement* to the 1987 USACE manual were deemed wetlands.

Wetlands were further classified using methods developed by Cowardin, *et al.*, (1979). Water sources were also classified according to the definitions in Smith, *et al.*, (1995). All wetlands were staked and marked in the field using pin flags or survey tape.

Functional assessments of all jurisdictional wetlands were conducted to characterize and better qualify/quantify the existing conditions of each wetland area. Lockheed Martin and state and federal regulators can use this information to determine the resulting reduction or increase in wetland functions and values associated with any future remediation project, as well as the value of any wetland functions that may need to be replaced for compensatory mitigation. The functions and values of each wetland delineated were determined using the functional assessment methodologies recommended in the *USACE Highway Methodology Workbook Supplement: Wetlands Functions and Values: A Descriptive Approach*, hereafter referred to as the Highway Method (USACE, 1999).

Highway Method—The Highway Method evaluates whether a wetland provides each of the eight functions and five values listed in Table 3-1. The Highway Method is a subjective

assessment method that relies more on the professional judgment of the assessor than do some other functional assessment methodologies. The Highway Method was designed for the USACE New England District as a rapid way to determine the occurrence of the specified functions and values in an evaluated wetland. It allows for direct comparison with other wetlands within the geographic boundary of the New England District (Bartoldus, 1999).

Assessing the functions and values of a wetland using the Highway Method involves reviewing the physical and biological properties of the wetland using a separate list of "considerations/qualifiers" for each of the 13 functions and values in Table 3-1. The evaluation uses physical and biological data available from various reports, publications, and other printed sources and from a site visit performed by the assessor. The assessor considers which of the 13 functions and values are present in the wetland (i.e., performed or otherwise demonstrated by the wetland), and which of the functions and values occurring in the wetland are principal functions of the wetland, meaning those functions that "are an important physical component of a wetland ecosystem (function only) and/or are considered of special value to society, from a local, regional, and/or national perspective" (USACE, 1999).

3.5 PASSIVE SOIL-GAS SAMPLING AND ANALYSIS

Passive soil-gas sampling was conducted August 2–18, 2010 near Taxiway Tango and the airport runway northwest, west, and southwest of wells DMW11S and MW33S. The surveys screened for possible VOC contamination in areas hydraulically upgradient of the two wells where VOCs in shallow groundwater have been found at concentrations exceeding Maryland groundwater standards. Groundwater samples at well DMW11S have historically contained the greatest concentrations of cVOCs in the Dump Road Area, with total cVOCs exceeding 86,000 micrograms per liter (µg/L). Total cVOCs in groundwater at well MW33S have exceeded 1,800 µg/L. VOCs have not been delineated at concentrations below Maryland groundwater standards northwest, west, and southwest of these two wells.

On August 2–4, 2010, GORE Sorber[™] passive soil-gas samplers (hereafter "sorbers") were installed four feet below grade at 101 locations to screen for the possibility of VOCs and total petroleum hydrocarbons (TPH) in the soil and shallow groundwater at the DMW11S and MW33S areas. Sorber locations are shown in Figure 3-2. Sorbers were installed in a grid pattern

and spaced approximately 50 feet apart. They covered more than 1.5 acres near each of the four target areas around monitoring wells MW33S (near the MANG Jet Engine Test Pad) and DMW11S (between Taxiway Tango and the airport runway).

Boreholes for the sorbers were advanced using a track-mounted Geoprobe[™] direct-push-technology rig. String connected the end of each sorber to a laboratory-supplied airtight cork. A sorber was inserted into each borehole using a stainless-steel insertion rod. After each sorber was inserted into the borehole, the stainless-steel rod was removed, decontaminated, and used at the next sampling location. The cork was tamped flush with the surface to seal the boring opening from the atmosphere. The cork provided an airtight seal, preventing above-ground air from entering the soil-gas boring and diluting the sorber-mass analysis. The sorbers remained in place for two weeks before retrieval and were removed on August 16–18, 2010.

Upon retrieving the sorbers from the subsurface they were placed in the laboratory-supplied shipping vials, sealed, and submitted to W. L. Gore & Associates, Inc. of Elkton, Maryland for chemical analyses. Boxes containing the sorbers and laboratory-supplied trip blanks were shipped to the laboratory along with the chain of custody forms, installation logs, and insertion rod.

Two sorbers (locations PSV-22 and PSV-58) were damaged during the exposure period and could not be analyzed for VOCs; therefore, the laboratory analyzed only 99 sorbers. Two additional sorbers (locations PSV-50 and PSV-73) were found on the ground outside of the borehole on the retrieval date; therefore, results for these modules may not fully represent subsurface conditions at those locations. These sorbers are believed to have been pulled from the boreholes and damaged by site rodents or birds.

The sorbers were analyzed for VOCs, TPH (C4-C20 aliphatics), and diesel alkanes (C11-C15 compounds) by USEPA Methods 8260/8270 for gas-chromatography/mass-selective detection, modified as necessary for the sampling method used. Five trip blanks were analyzed by the same methods. Gore & Associates compiled the data and presented the analytical results and chain of custody documentation in a report that appears in Appendix C.

3.6 AQUIFER HYDRAULICS TESTING

In 2003, single-well hydraulic tests (i.e., slug tests) were performed on 38 Dump Road Area wells, including MW1 through MW7, well clusters DMW1S/A/B through DMW11S/I, and lower surficial-aquifer wells DMW3D through DMW9D. These tests were performed using the solid slug method, where a solid cylinder several feet long is inserted into the water column of a well to temporarily displace a portion of the groundwater water in the well. Slug tests estimate the aquifer's hydraulic conductivity (or formation permeability). These results are then used to assess groundwater and contaminant movement in the subsurface. Results of the 2003 slug tests appear in Table 3-2.

In 2007, 72-hour pumping tests were conducted in the upper and intermediate surficial-aquifer zones near wells DMW2S/A/B to estimate hydraulic conductivity and pumping rates for a treatability study to be conducted in this area. The results of the long-term pumping tests appear in Table 3-3. On August 2–4, 2010, single-well hydraulic tests using the slug test method were conducted on 16 surficial-aquifer wells and one deep well in the Dump Road Area as part of the supplemental RI tasks. The emphasis of the 2010 testing was on the lower surficial-aquifer zone in wells where previous hydraulics tests had not been performed, and where hydraulic data were required for groundwater modeling.

The 2010 slug tests used the pressurized test method (i.e., pneumatic test method), which uses pressurized air instead of a solid cylinder (i.e., slug) to induce an initial displacement of the groundwater level in a well. Advantages of the pneumatic slug test method as compared to other slug test methods are that no water is added or removed from the well (as in the case of using a water "slug"), and equipment decontamination is minimized (i.e., does not require cleaning a solid cylinder or "slug"). The pneumatic initiation of the slug test also provides high quality data with minimal noise, which is especially important for tests in high conductivity formations and small diameter wells.

A slug test estimates horizontal hydraulic conductivity for the geologic/aquifer formation that the well is screened against. Horizontal hydraulic conductivity is a primary characteristic of porous media, as expressed in Darcy's Law, the fundamental governing equation describing groundwater flow. It says that the rate of groundwater flowing through porous media is directly

proportional to the hydraulic conductivity, as is the groundwater flow velocity. Estimating hydraulic conductivity is a critically important step in site characterization because groundwater flow and contaminant-transport modeling incorporate Darcy's Law as the primary basis of the simulation (along with water balance considerations).

Slug tests offer key advantages in comparison to other more complicated and longer-duration test methods. For example, slug tests can be performed quickly if the formation material is composed of gravel, sand, or silt. This quickness permits multiple tests in a single well, enabling verification and cross-checking. Further, the tests do not generate purge water, in contrast to aquifer pumping tests, and the amount of instrumentation and equipment is generally less than with other more intensive, multi-well test procedures.

Disadvantages of slug-testing include such factors as the limited volume of the aquifer being stressed, the difficulty of extrapolating the results to a full-aquifer-unit-thickness transmissivity estimate and, sometimes, the appearance of oscillations. Regarding transmissivity estimates: the piezometers have screens extending vertically across a significant fraction of the full thickness of the surficial-aquifer units, thus the testing can be assumed adequately representative for extrapolation. The graphs representing the water-level-recorder data show no oscillatory responses or other similar complication.

Seventeen monitoring wells were subjected to the pressurized test method in August 2010 (Table 3-4). Figure 3-3 shows the locations of the MSA groundwater monitoring wells. The bulk of the slug tests were performed on 11 wells screened in the lower surficial-aquifer (i.e., wells DMW8D, MW15D through MW23D, and MW26D) and one well beneath the surficial aquifer (MW14D). Wells MW14D through MW23D and MW26D are newly installed wells that have had no previous hydraulics testing. Two tests were performed at most wells to provide a second set of test data for analysis. DMW7I and DMW8D were tested to compare results for both the solid slug test method used previously and the pneumatic method employed for this study. In addition, five wells screened in the upper and intermediate surficial-aquifer (DMW7I, MW24S, MW24I, MW32I, and MW34I) were tested to provide comparisons across vertical zones and to provide additional spatial coverage of hydraulic characteristics for the surficial aquifer.

Test methodology—Pneumatic slug-testing was in accordance with American Society for Testing and Materials (ASTM) International Method D7242-06, "Standard Practice for Field Pneumatic Slug (Instantaneous Change in Head) Tests to Determine Hydraulic Properties of Aquifers with Direct-Push Ground Water Samplers" (ASTM, 2006), and Tetra Tech Standard Operating Procedure GH-2.4, "In situ Hydraulic Conductivity Testing." The pneumatic slug test uses air pressure to cause a sudden change in the groundwater level in the monitoring well being tested. To do this, a pneumatic manifold is installed on the well to control the pressure inside the well. Then, the water level in the well is depressed by applying a positive air pressure using a hand pump; the subsequent sudden release of air pressure induces a rising head. The changing water level in the well is monitored and recorded using an electronic pressure transducer and data logger (*In-Situ*[™] Level TROLL 700). Data values are saved to a portable computer for curve fitting and data analysis to estimate horizontal hydraulic conductivity.

Equipment used for the pneumatic slug tests includes a pneumatic manifold, a pressure transducer/data logger, a hand pump (to supply pressurized air), an electronic water level meter, miscellaneous hand tools, a laptop computer, and a field notebook. The pneumatic manifold is an airtight system that permits the introduction and control of air pressure inside the well casing. The manifold consists of an inlet valve with a fitting for an air supply (i.e., hand pump), a pressure gage to monitor pressure in the wellhead, airtight fittings to allow the transducer cable to slide for placement at various depths in the well, a release valve, a casing adapter that allows the manifold to attach to the well casing, and a pressure transducer/data logger to monitor and record change in water levels in the well.

An electronic water level meter measured the depth of the static water level and well depth before the test. A small hand pump produced low pressure to depress the water level in the well. Tools, such as wrenches to loosen and tighten fittings, TeflonTM tape to seal fitting threads, and an electrical power inverter to convert 12-volt direct current power from the field vehicle to 120-volt alternating current (to power or charge the battery for a portable computer), were also used for the testing. A portable computer was used to observe real-time graphs of the slug tests and to download the test files after each test. Pertinent information on wells and slug tests was recorded in a bound field-notebook. A table of well construction data (well depth, well screen depth, etc., see Table D-1 in Appendix D), and geologic cross sections (see Appendix D) were

brought to the field to evaluate the applicability of the pneumatic test to the well. Groundwater levels were maintained above the top of the well screen at all times in all wells tested.

Except for well MW17D, groundwater levels in the wells tested were allowed to recover to more than 90% of the static level. However, a pneumatic test of well MW17D on August 2, 2010 indicated a very slow recovery period, and the test was abandoned after 15 minutes because of insufficient water level recovery. A solid slug was then used to conduct a new, long-duration test at well MW17D, and to allow the pneumatic test equipment to be used for other tests during the three hour MW17D test period. Groundwater level data, "Slug Test Field Information Forms," well construction data, and geologic cross-sections used for the tests are provided in Appendix D.

Slug test analysis—Slug test data were analyzed using hydraulic test models described in ASTM Standard D-4043, "Standard Guide for Selection of Aquifer Test Method in Determining Hydraulic Properties by Well Techniques" (ASTM, 2009). ASTM Standard D-4043 provides a decision tree for selecting the appropriate analytical model based on aquifer and test types. The results were analyzed using AQTESOLVE® (2008). AQTESOLVE® (2008) is software specifically developed for aquifer hydraulics analyses, including slug tests. AQTESOLVE® (2008) provides analytical solutions for unconfined and confined aquifer conditions for both overdamped and underdamped slug test responses. Underdamped responses in slug tests result in oscillations of the water levels immediately after the slug test begins. Underdamped responses typically occur in aquifer formations with high hydraulic conductivities. However, underdamped responses were not observed in the MSA slug test data. Results from wells DMW8D and DMW7I were used to compare the results of the pneumatic tests to the solid slug test methods used previously.

Slug test data were analyzed, based on site conditions, using the methodology developed by Bouwer and Rice (1976) and Bouwer (1989), which is based on Thiem's equation for steady-state flow. Although the Bouwer and Rice method was primarily designed for unconfined aquifers, the method is still applicable to the MSA slug tests because of the leaky nature of the aquitard(s) (Bouwer and Rice, 1976). This method can also be used for fully or partially penetrating wells. Note that slug tests estimate the characteristics of a small volume of aquifer material surrounding the well. This volume may have been disturbed during well drilling and

construction. However, slug tests do estimate aquifer parameters fairly accurately (Kruseman and de Ridder, 1990). Slug test analyses appear in Appendix D.

3.7 LONG-TERM GROUNDWATER LEVEL MONITORING

Continuous water level recorders were installed and operated in three groundwater-monitoring wells in the Dump Road Area. These recorders were operated in conjunction with the level recorders installed/operated at Conrad's Ruth Villa and Parkside Marina on the eastern shoreline of Frog Mortar Creek. The three recorders were installed at a single Dump Road well cluster (DMW4S/I/D) to monitor wells screened in the upper, intermediate, and lower surficial-aquifer zones. These wells were selected due to the cluster's proximity to Frog Mortar Creek and the cluster's location with respect to both the VOC contaminant plume and the recorders placed at Conrad's Ruth Villa and Parkside Marina.

Groundwater levels were measured and recorded using combined electronic pressure-transducers and data loggers capable of storing level and time data at 15-minute intervals for one month (i.e., *In-Situ*[™] Level Troll 700). Each pressure transducer/data logger was calibrated by the manufacturer and configured by Tetra Tech to collect water levels at the aforementioned interval for a month (June 2–July 6, 2010). Tetra Tech downloaded the data and calculated water level elevations for the three wells in conjunction with data downloads for the recorders at Conrad's Ruth Villa and Parkside Marina. Level data are presented and evaluated in the *Off-Site Piezometer Installation and Water Level Monitoring Report* (Tetra Tech, 2010e).

3.8 GEOPHYSICAL INVESTIGATION

Enviroscan, Inc. conducted a geophysical survey for 21 acres of primarily undeveloped land southeast of the Dump Road Area. The geophysical investigation detected and delineated the horizontal boundaries of possible manmade fill areas and possible buried debris. The geophysical survey ranged from the southern boundary of the previous 2007 Dump Road Area geophysical survey to south of the MSA compass rose, and included the concrete connector between the airport runway and Taxiway Tango (see Figure 3-1). The survey entailed a reconnaissance-level EM survey using a Geonics, Inc. model EM-31MK2 instrument, which is effective in detecting variations in soil conductivity (related to fill type and moisture content) and detecting subsurface

metallic objects. Anomalies were surveyed with a hand-held TW-6 metal detector to confirm field scans. The geophysical survey report appears in Appendix E.

The Geonics, Inc. model EM-31MK2 instrument measures the electrical conductivity of subsurface materials by using a transmitter coil to generate an electromagnetic field that drives an electrical current into the ground. A receiver coil at a fixed separation from the transmitter is tuned and oriented to be insensitive to the transmitted field, and therefore measures only a secondary electromagnetic field generated by the subsurface electrical current. The strength and orientation of this field can be used to accurately estimate the electrical conductivity (terrain conductivity) and/or relative metallic content (in-phase response) of the subsurface materials. Note that terrain conductivities are typically elevated in waste burial areas due to prior ground disturbances and the presence of wastes and/or debris, as well as in leaching fields due to dissolved salts/solids in the soils.

Using a Geonics EM-31MK2 terrain conductivity meter, terrain conductivity readings (to an approximate depth of 25 feet) were collected at one-second (five-foot) intervals along profiles spaced approximately 10–20 feet apart and spanning all accessible areas of the survey area. Location controls (with sub-meter accuracy) were recorded using differential global positioning systems (GPS). Measurement locations were recorded using a mobile GPS receiver, with differential corrections to be applied relative to a fixed base-station GPS receiver. The EM in-phase and terrain conductivity data were also contoured and overlain on a base map of the site to identify any terrain conductivity anomalies of the type commonly associated with burial areas or other targets exhibiting anomalous terrain conductivities and/or in-phase response (e.g., metallic content).

3.9 SYNOPTIC WATER LEVEL MEASUREMENTS

One round of water levels was measured from the MSA monitoring wells. The static water level was determined by lowering the meter's probe into the well until the liquid level indicator emits an audible tone, indicating the air/water interface. The water level was read from the probe cable and recorded to the nearest 0.01 foot as the depth to water. The water level measurements were recorded on a groundwater level measurement field form. Levels were recorded in as short a period as possible and within a single day to minimize the effects of diurnal and tidally-induced fluctuations

in groundwater levels. Water levels were measured on July 2, 2010 from 7:25–10:50 a.m., which was during the rising limb of a tidal cycle from 5:45–11:45 a.m. Groundwater level measurements appear in Appendix F.

3.10 GROUNDWATER MODELING

Ongoing groundwater flow modeling supports the FS and helps develop remediation alternatives to address VOC and 1,4-dioxane groundwater contamination at the Dump Road Area. Remediation alternatives are based on the primary objectives of controlling and capturing contaminated groundwater at MSA using hydraulic-barrier pumping wells to prevent plume migration into off-site areas and toward Frog Mortar Creek. New site data collected during this supplemental program will update the existing groundwater model.

Supplemental field studies have examined groundwater flow conditions on the other side of Frog Mortar Creek, evaluated tidal fluctuations, and better estimated the hydraulic conductivity of the lower surficial-aquifer. These newer data update and refine the groundwater flow model to further improve the remedial design and the effectiveness of the hydraulic barrier wells. The model update and refinement are summarized below. Details and results of the update and refinement will appear in a separate groundwater modeling report.

Model update and refinement—The model update consists of examining recently collected Dump Road Area data, which includes water level data, groundwater potentiometric-surface maps, hydrographs, aquifer hydraulic characteristics, groundwater chemical data, chemical data time-series plots, and plume maps. The conceptual model was refined based on a review of the new site data. This conceptual hydrogeologic and geochemical model serves as the framework for updating the groundwater flow and chemical transport model.

After updating the conceptual model based on the recently collected site data, the numerical groundwater flow and solute-transport model construction was refined. As part of model construction, model layers were updated based on the new site data and any available new regional data. Initial hydraulic conductivity values were also updated based on the results of the recent slug testing at the site.

Flow-model calibration update—Calibration of the project's groundwater flow model will be updated through a series of simulations and by adjusting the model to match the field data, according to industry-standard criteria. The groundwater flow model-calibration will be verified by comparison to an independent set of previously collected water level data. The model update simulations will include both steady-state and transient runs. In steady-state mode, a calibration-verification simulation will be conducted based on the 2010 round of water level data.

The flow-model calibration will be performed in accordance with ASTM D 5891, "Standard Guide for Calibrating a Groundwater Flow Model." Transient simulations compare both pumping test and tidal measurements at the site. For the pumping test, observed versus simulated drawdown over time will be examined at wells where data are available. For the tidal measurements, the transient model will examine the ability of the model to match the new transducer data collected from both Frog Mortar Creek and piezometer well clusters.

Groundwater-flow model remedial analyses—Following calibration of the flow model, the groundwater flow model will be applied to examine the hydraulic capture zones for three remedial scenarios. In these simulations, modeling will help select well locations and appropriate injection/extraction rates. These analyses will include examining the extent of hydraulic influences on the flow field to improve and enhance plume capture. Modeling will also examine pressure increases to help limit the effects of potential mounding during injection.

Table 3-1
Common Functions and Values of Wetlands According to the Highway Method—
Lockheed Martin, Martin State Airport, Middle River, Maryland

Functions					
Groundwater recharge/discharge	Considers the potential for a wetland to serve as a groundwater recharge or discharge area (or both). Reflects the fundamental interaction between wetlands and aquifers, regardless of the size or importance of either.				
Flood-flow alteration	Considers the effectiveness of the wetland in reducing flood damage by water retention for prolonged periods following precipitation. Adds to the stability of the wetland ecological system or its buffering characteristics and provides social and economic value relative to erosion and flood control.				
Fish and shellfish habitat	Represents the effectiveness of seasonal or permanent watercourses associated with the wetland in question as fish and shellfish habitat.				
Sediment/toxicant retention	Considers the ability of a wetland to reduce or prevent degradation of water quality. Relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens in runoff water from surrounding uplands or upstream eroding areas.				
Nutrient removal	Represents the effectiveness of the wetland in trapping nutrients in runoff water from surrounding uplands or contiguous wetlands and the ability of the wetland to convert these nutrients into other chemical forms or trophic levels. One element is the ability of the wetland to prevent ill effects from nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, and estuaries.				
Production export	Represents the effectiveness of the wetland in producing food or usable products for man and other living organisms.				
Sediment/ shoreline stabilization	Represents the effectiveness of a wetland in stabilizing stream banks and shorelines against erosion.				
Wildlife habitat	Represents the effectiveness of the wetland as habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Also represents the use of the wetland as habitat for migrating species and species dependent on the wetland at some time in their life cycles.				
Values					
Recreation	Represents the suitability of the wetland and associated watercourses in providing recreational opportunities such as canoeing, boating, fishing, hunting, and other active or passive activities.				
Educational/ scientific value	Considers the suitability of the wetland as an "outdoor classroom" or as a location for scientific study or research.				
Uniqueness/ heritage	Considers certain special characteristics of the wetland or its associated water bodies. These may include archaeological sites, critical habitat, overall health and appearance, role in the ecological system of the area, or relative importance as a typical wetland class for its geographic region.				
Visual quality/aesthetics	Represents the visual and aesthetic quality or usefulness of the wetland.				
Endangered species habitat	Represents the suitability of the wetland in supporting species whose survival has been officially acknowledged as being threatened or endangered.				

Source: USACE, 1999

Table 3-2
Previous Slug Test Results—Surficial Aquifer—
Lockheed Martin, Martin State Airport, Middle River, Maryland
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Upper surficial-aquifer					
Well ID	Falling head test (feet/day)	Rising head test (feet/day)	Average (feet/day)		
DMW1S	10.00	10.00	10.00		
DMW2S	3.00	3.00	3.00		
DMW3S	0.06	0.04	0.05		
DMW4S	4.00	7.00	5.50		
DMW5S	0.30	0.30	0.30		
DMW6S	4.00	5.00	4.50		
DMW7S	3.00	3.00	3.00		
DMW8S	0.30	0.50	0.40		
DMW9S	20.00	20.00	20.00		
DMW10S	20.00	20.00	20.00		
DMW11S	0.50	0.50	0.50		
MW-3 ¹	No data	0.20	0.20		
MW-4	1.00	1.00	1.00		
MW-5	0.20	0.20	0.20		
MW-6	10.00	10.00	10.00		
MW-7	0.20	0.20	0.20		
Intermediate surficial-aquifer					
DMW1A	3.00	3.00	3.00		
DMW2A	2.00	4.00	3.00		
DMW3I	8.00	9.00	8.50		
DMW4I	5.00	7.00	6.00		
DMW5I	2.00	3.00	2.50		
DMW6I	10.00	10.00	10.00		
DMW7I	20.00	20.00	20.00		
DMW8I	20.00	20.00	20.00		
DMW9I	1.00	1.00	1.00		
DMW10I	1.00	2.00	1.50		
DMW11I	0.90	0.90	0.90		

Table 3-2
Previous Slug Test Results—Surficial Aquifer—
Lockheed Martin, Martin State Airport, Middle River, Maryland
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Well ID	Falling head Rising head test test (feet/day) (feet/day)		Average (feet/day)	
Intermediate surficial-aqui	fer			
$MW1^{(I)}$	No data	35.80	35.80	
MW2 ⁽¹⁾	No data	4.81	4.81	
Lower surficial-aquifer				
DMW1B	0.2	0.2	0.20	
DMW2B	0.5	0.5	0.50	
DMW3D	9.0	10.0	9.50	
DMW4D	3.0	3.0	3.0	
DMW5D	2.0	4.0	3.00	
DMW6D	2.0	2.0	2.00	
DMW7D	10.0	10.0	10.00	
DMW8D	6.0	7.0	6.50	
DMW9D	5.0	5.0	5.00	

⁽¹⁾Slug tests by Maryland Environmental Service in 1994

Table 3-3

Summary of Pumping Test Results

Lockheed Martin Martin State Airport, Middle River, Maryland

	Well Distance		Aquifer	Transmissivity	Hydraulic Cond.	Storage	
Well ID	Pumping to Observ. (Feet)	Drawdown (Feet)	Thicknes (Feet)	Drawdown (Sqaure feet/day)	Drawdown (Feet/day)	Drawdown (Dimensionless)	Comments
RW01S TEST							
OW01S	4.78	0.37	4	164.2	41.1	2.49E-03	Confined
RW01I Test							
OW01S	36.89	0.07					Analysis not performed.
OW01I	24.32	1.18	34	1930.2	56.8	1.57E-06	Confined
DMW2A	17.44	1.16	34	1830.2	53.8	1.88E-05	Confined
DMW3I	155.91	0.46	17	2378.4	139.9	1.24E-04	Confined
DMW4I	266.86	0.39	34	1431.5	42.1	5.19E-04	Confined
DMW8I	182.42	0.40	23	1793.1	78.0	1.60E-04	Confined
Mean (Arithmetic) ¹	129.39	0.72	28	1872.7	74.1	1.65E-04	
Mean (Geometric) ¹	79.72	0.63	27	1848.2	67.5	4.97E-05	

^{-- =} Analysis not performed.

Observation well not shown on table if there is no apparent drawdown measured.

¹ Intermediate surficial aquifer observation wells for RW01I test only.

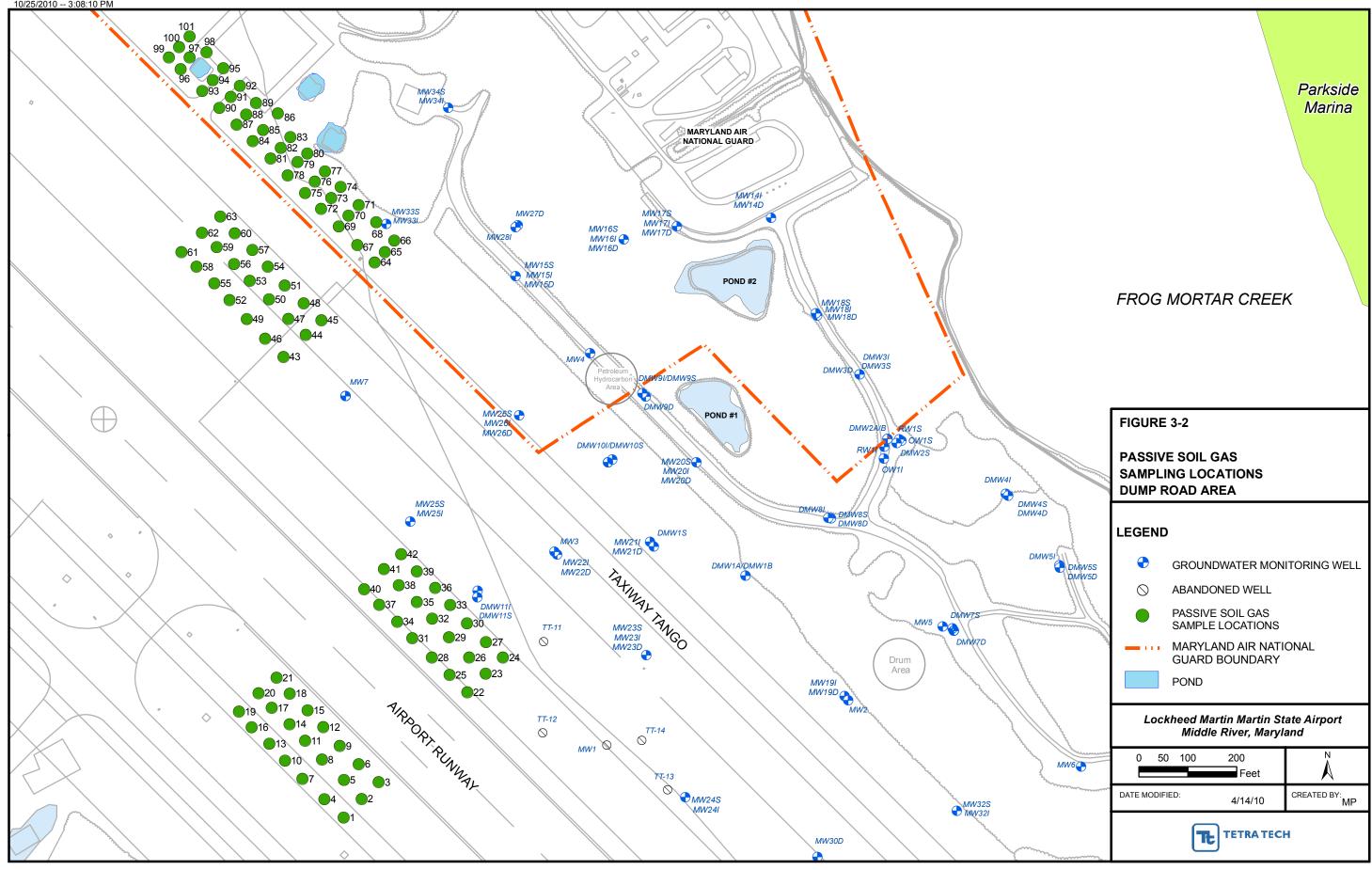
Table 3-4 Slug Tests, August 2010 Lockheed Martin, Martin State Airport, Middle River, Maryland

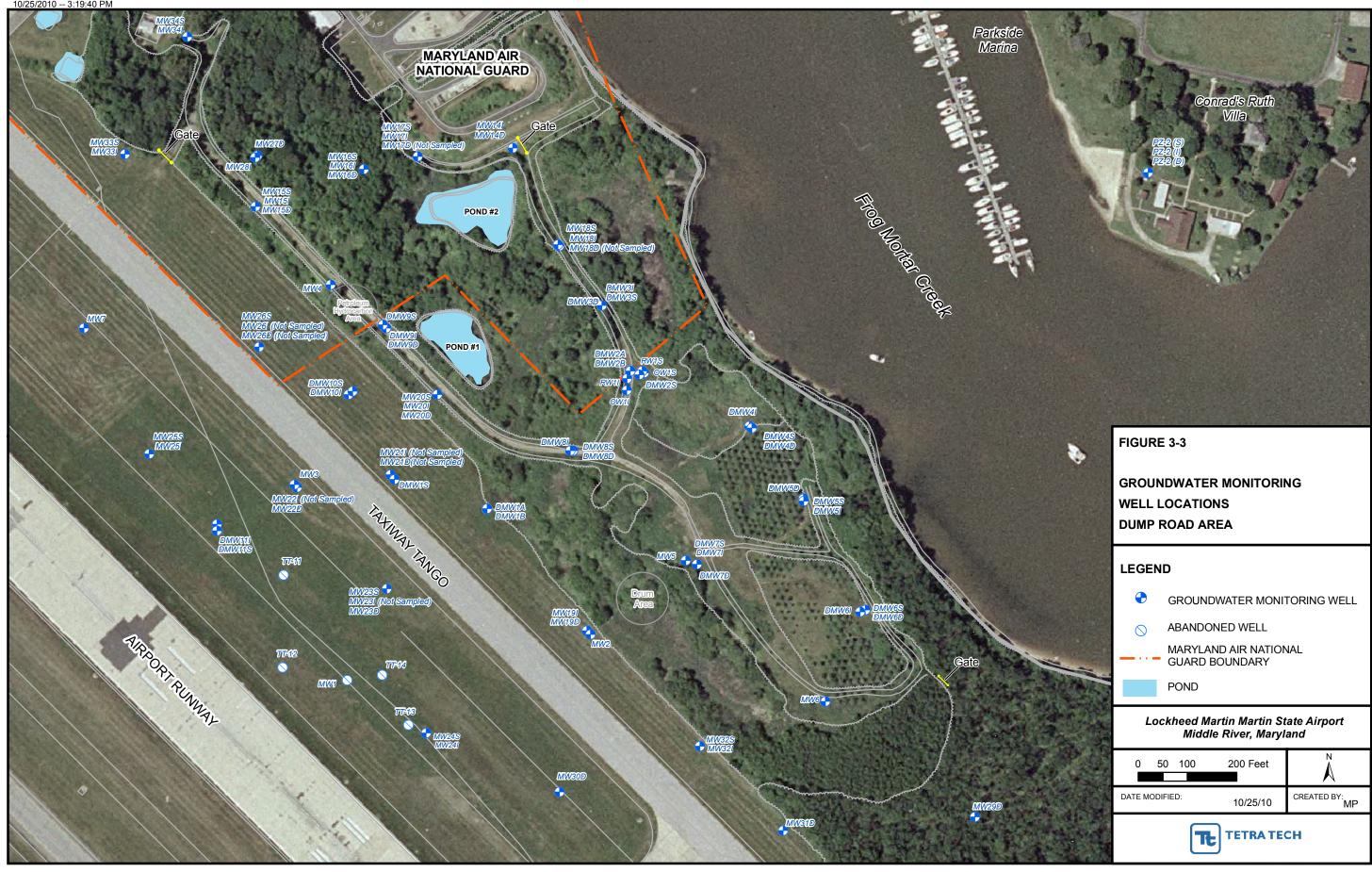
Deep surficial-aquifer wells
$\mathrm{DMW8D}^{(I)}$
MW14D
MW15D
MW16D
MW18D
MW19D
MW20D
MW21D
MW22D
MW23D
MW26D
Deep well below the lower surficial-aquifer
MW17D
Shallow and intermediate surficial-aquifer wells
DMW7I ⁽¹⁾
MW24S
MW24I
MW32I
MW34I

⁽¹⁾ This well was tested in 2003 and later tested as part of this study to compare results of both the solid slug and pneumatic slug methods.



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Section 4 Investigation Results

This section presents the results for the topographical mapping, passive soil-gas survey, aquifer hydraulics testing (i.e., slug tests), geophysical survey, and synoptic groundwater levels. Section 4.1 briefly discusses the topographic mapping. The results of the passive soil-gas sampling, aquifer hydraulics tests, geophysical survey, and synoptic groundwater levels are discussed in sections 4.2 through 4.5. The results of the wetlands delineation, long-term surface water-level and groundwater-level monitoring, and groundwater modeling update are provided in separate documents and are not repeated in this report.

4.1 TOPOGRAPHICAL MAPPING

The topographic maps generated for this investigation are provided in Appendix B. Two maps were produced as part of the survey. The first shows the surveyed area extending from the MANG armory to the southern edge of the Dump Road Area. The second covers the southeastern corner of MSA east of Taxiway Tango. The drawings have a topographic-contour interval of one foot, based on NAVD88.

Site topography for the Dump Road Area ranges from flat to gently sloping to the northeast toward Frog Mortar Creek. In the northern portion of the Dump Road Area, land elevations range from approximately 11 feet above NAVD88 near the runway to approximately seven feet above NAVD88 at Pond No. 2. In the southeastern portion of the site, land elevations are approximately 20 feet above NAVD88 at a mounded area near the embankment, near Frog Mortar Creek. A steeply sloped embankment lies along the Frog Mortar Creek shoreline, comprised of fill placed there as part of airport construction. The elevation of the top of the embankment ranges from approximately 10 feet above NAVD88 at the northern portion of the Dump Road Area to approximately 20 feet above NAVD88 in the southern portion.

The area south of the Dump Road Area is flat to gently sloping in the area of a large, lobate area north of the wetland. A steep embankment runs along the Frog Mortar Creek shoreline and along

the northern edge of the wetland. Land in the southeastern corner of the surveyed area south of Taxiway Tango and the compass rose gently slopes from an elevation of eight feet southward to Frog Mortar Creek, at an elevation approximately one foot above NAVD88.

4.2 PASSIVE SOIL-GAS SURVEY

Ninety-nine passive soil-gas samples were analyzed for VOCs, TPH (carbon-4 through carbon-20 aliphatics), and diesel alkanes (carbon-11 through carbon-15 compounds). Sorber results indicate the presence and relative abundance of contaminants in the subsurface soil-gas. Results are reported as the mass (i.e., micrograms) of compounds adsorbed in the module over the in-ground measuring period. A detected contaminant mass may have originated from a combination of sources, such as soil, groundwater, or free product (i.e., petroleum or solvent product); however, the contaminant-source media may not be readily identified by the sorber results alone.

Results of the laboratory analyses are summarized in Table 4-1. Appendix C contains all of the soil-gas chemical analytical results, including analytes detected and those not detected. As noted in section 3, samples PSV-22 and PSV-58 were damaged and could not be analyzed for VOCs. Samples PSV-50 and PSV-73 were analyzed but were reported to be on the ground outside of the borehole; therefore, results for these two samples may not fully represent subsurface soil-gas conditions at these locations.

Several VOCs were detected in the samples, including TCE, cis-1,2-DCE, and the petroleum-related VOCs benzene, toluene, ethylbenzene, and xylene (BTEX). Benzene was the most frequently detected BTEX constituent; however, benzene was typically reported at low masses ranging from 0.02–3.45 µg. For samples with high total VOC masses (i.e., typically, total VOCs greater than 5 µg, such as PSV-54, PSV-60, and PSV-67), xylenes were the predominant BTEX constituent detected. TPH was also detected in the samples. However, diesel alkanes were detected less frequently and at much lower masses than the aliphatic hydrocarbons. Figures 4-1 through 4-5 show distributions of TCE, cis-1,2-DCE, BTEX, naphthalene/2-methylnaphthalene, and TPH (aliphatic hydrocarbons).

As shown in Figures 4-1 and 4-2, TCE and cis-1,2-DCE were detected northwest of well MW33S and, to a lesser degree, northwest of DMW11S. The maximum TCE and cis-1,2-DCE

masses were reported for sample PSV-75 (51.51 μg and 73.12 μg for TCE and cis-1,2-DCE, respectively), approximately 180 feet northwest of well MW33S. Sample PSV-70 had the second highest TCE and cis-1,2-DCE masses in the MW33S area, at 9.91 μg and 6.89 μg , respectively. PSV-70 is midway between MW33S and PSV-75.

TCE was also detected at relatively greater masses on the western side of Taxiway Tango at PSV-60 (8.58 μ g) and PSV-44 (2.07 μ g). The distribution of cis-1,2-DCE in the MW33S area is similar to that of TCE. TCE and cis-1,2-DCE were not detected at sampling locations PSV-50, PSV-52, PSV-53, PSV-55, PSV-58, PSV-61, PSV-62, PSV-63 PSV-84, PSV-85, PSV-87, PSV-88, PSV-90, and PSV-99, indicating possible northwestern boundaries of cVOC contamination. West and northwest of well DMW11S, TCE was detected at relatively low masses at PSV-3, PSV-35, PSV-36, and PSV-38, ranging from 0.03–0.10 μ g. Cis-1,2-DCE was not detected in these samples.

As shown in Figures 4-3 through 4-5, BTEX, naphthalene/2-methylnaphthalene, and TPH have mass distributions similar to the cVOCs. The highest concentrations of BTEX, naphthalene/2-methylnaphthalene, and TPH are west and northwest of MW33S, with lower masses on the western side of Taxiway Tango in this area. However, the distribution of TPH is more extensive than the other analytes on both sides of Taxiway Tango. Samples PSV-46 and indicate that TPH may extend west of the sampled PSV-43 naphthalene/2-methylnaphthalene, and TPH levels northwest and west of DMW11S are also lower than the MW33S The highest concentrations of BTEX, area. naphthalene/2-methylnaphthalene, and TPH are in the northern-northwestern edge of the two DMW11S sampling areas at sampling locations PSV-42, PSV-41, PSV-38, and PSV-21.

The relative masses of benzene and TPH in the passive soil-gas samplers are similar to the relative concentrations of those compounds in groundwater at the nearest shallow monitoring well (MW33S). That is, TPH soil-gas masses and TPH groundwater concentrations are approximately 25-100 times higher than benzene soil-gas masses and benzene groundwater concentrations. However, total xylenes masses are 50 times greater than benzene in the soil-gas samples, whereas xylenes were not detected in groundwater at MW33S (benzene in groundwater is $22 \mu g/L$).

The relative benzene/xylenes/TPH masses in the passive soil-gas samples indicate that the source of the contamination is either a weathered gasoline or a heavier petroleum product, such as diesel or jet fuel. Diesel-range organics are present at MW33S at concentrations of 140 µg/L and gasoline-range organics are present at MW33S at a concentration of 320 µg/L. Therefore, despite the low relative masses of diesel-range alkanes in the passive samples, diesel/jet fuel cannot be ruled out in that area. The VOC source cannot be readily determined based on the soil gas results. Further, at these low masses and concentrations, fuel fingerprinting may not be effective at defining contaminant sources and ages.

4.3 AQUIFER HYDRAULICS TESTS

Table 4-2 presents the slug test results. Hydraulic conductivities for slug tests range from 6.68×10^{-5} ft/day at MW17D to 66 ft/day for MW24I (intermediate surficial-aquifer zone). The range of hydraulic conductivities for the lower surficial-aquifer wells is 2.74 ft/day at MW18D to 25.5 ft/day at MW15D. The results for MW14D, MW17D, and MW26D are not considered representative of the lower surficial-aquifer. Well screens for MW17D and MW26D are set predominantly in clay, silty clay, or a sand-clay mix, and do not reflect the thick zone of permeable sands encountered southeast and east of these two wells. The base of the lower surficial-aquifer in the Dump Road Area is typically 70–95 feet below grade (50–75 feet below NAVD88). The well screen for MW14D is set in dense silt at 108–118 feet below grade (elevation of 100–110 feet below NAVD88), and below several clayey and silty confining or semi-confining layers. Therefore, well MW14D monitors materials beneath and hydraulically separate from the lower surficial-aquifer.

The geometric average of the lower surficial-aquifer slug tests, excluding MW17D and MW26, is 8.4 ft/day (arithmetic mean is 11.3 ft/day). The 2010 results suggest that higher hydraulic conductivities for the lower surficial-aquifer form a northwest-southeast line along the middle of the site from MW15D (25.5 ft/day), MW20D (18.4 ft/day), and MW19D (19.3 ft/day), with lower conductivities (ranging from 2.74–9.52 ft/day) southwest (MW21D and MW22D) and northeast (MW16D, MW18D, and DMW8D) of these wells. A comparison of the 2003 and 2010 slug test results for wells DMW7I and DMW8D (see Table 4-2) indicate that both test methods provide comparable results (i.e., same order of magnitude estimates).

4.4 GEOPHYSICAL SURVEY

Figures 2 and 3 in Appendix E ("Geophysical Survey Report") present the results of the EM survey. The figures are contour maps showing the results of the EM in-phase response and EM terrain-conductivity surveys. Four geophysical anomalies (i.e., areas of elevated instrument responses) were identified and are shown as anomalies A–D on the figures. One small area in the northwestern corner of the survey area (labeled "Surface Metallic Debris" in Figure 2) was found to have metallic surface debris and other debris, including tires and metal cabinets, scattered across the ground. The northwestern portion of the 2010 survey area includes an area previously surveyed in 2007 using EM techniques (hereafter, the "survey overlap area"). Except for the areas adjacent to the chain-link fence, the 2007 and 2010 results in the survey overlap area are similar, with the southern portion of the survey overlap area indicating "normal" soil conditions, and the northern portion of the survey overlap area indicating low to moderate conductivities.

The results in other areas of the survey area do not indicate metallic materials in the subsurface. Anomaly A was identified as a possible underground non-metallic vault or other utility appurtenance associated with a nearby suspected utility. Anomalies B and C were identified as broad, moderate-amplitude anomalies suspected of being higher-conductivity soil containing more clay minerals. Both EM anomalies were scanned with a TW-6 metal detector. Metal is not associated with the anomalies based on the TW-6 scans. Anomaly D is a high-amplitude anomaly associated with the tidal wetland area. The EM responses are considered the result of wet mineral-rich soil and brackish water commonly encountered in wetland environments.

Several areas could not be surveyed due to access difficulties. Areas along the Frog Mortar Creek shoreline consist of steep embankments or areas inundated with tidal water from Frog Mortar Creek. The steep embankments could not be surveyed due to safety concerns, and areas near Frog Mortar Creek flooded by tidal surface water prohibited the use of the EM instrumentation. However, the absence of survey data in these areas does not appear to be a concern because the survey results do not indicate fill or buried metallic debris in these areas, and the boundaries of possible geophysical anomalies (e.g., Anomaly B) were delineated.

The wetland area (Anomaly D) also could not be completely surveyed due to access limitations. However, the absence of the survey data in this area is not considered a concern because most of the Anomaly D area was surveyed, and the elevated EM responses were considered the result of wet mineral-rich soil and brackish water and not from fill or buried materials. It is recommended that EM anomalies A–D and the smaller EM anomalies in the northwestern corner of the survey area be excavated using test pits to verify the presence or absence of buried materials at these locations.

4.5 SYNOPTIC WATER LEVEL MEASUREMENTS

Table 4-3 presents the July 2010 groundwater level measurements and computed groundwater elevations for the Dump Road Area. Figures 4-6 through 4-8 show the July 2010 groundwater elevation contour maps for the upper, intermediate, and lower surficial-aquifer zones. Figure 4-9 shows a groundwater-elevation contour map for the deep confined-aquifer zone. As seen in Table 4-3 (and accounting for well stickup, where applicable), static groundwater levels measured in wells are reported at depths ranging from 5–19 feet below grade in each of the upper, intermediate, and lower surficial-aquifer wells.

As shown in Figures 4-6 through 4-8, groundwater in the upper, intermediate, and lower surficial-aquifer generally flows northeast from the runway and taxiway toward Frog Mortar Creek. An elevated groundwater level at DMW8S indicates local groundwater mounding south of Pond 1. Well DMW8S is installed in a clay-rich zone above the more permeable sands where the surrounding wells are installed. Therefore, the groundwater level in DMW8S may reflect localized perched groundwater in this portion of the Dump Road Area. Groundwater in the deep confined-aquifer (Figure 4-9) flows from northwest to southeast.

Table 4-1

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FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	640668	PSV-2 640655 8/25/2010	PSV-3 640654 8/26/2010	PSV-4 640667 8/25/2010	PSV-5 640656 8/26/2010	PSV-6 640653 8/27/2010	PSV-7 640666 8/25/2010	
VOLATILES (ug)								
1,2,4-TRIMETHYLBENZENE								
1,2-DICLOROBENZENE								
1,3,5-TRIMETHYLBENZENE								
2-METHYL NAPHTHALENE		0.02						
BENZENE	0.19	0.04	0.03	0.11	0.03	0.02	0.06	
BTEX	0.19	0.04	0.03	0.11	0.08	0.02	0.06	
CHLOROBENZENE								
CHLOROFORM								
CIS-&TRANS-1,2-DICHLOROETHENE								
CIS-1,2-DICHLOROETHENE								
ETHYLBENZENE								
M,P-XYLENE					0.05			
NAPH&2-MN		0.17						
NAPHTHALENE		0.15						
OCTANE								
O-XYLENE								
PENTADECANE								
TETRACHLOROETHENE			0.07					
TMBs ⁽¹⁾								
TOLUENE								
TRANS-1,2-DICHLOROETHENE								
TRICHLOROETHENE			0.07					
TRIDECANE								
UNDECANE		0.30			0.07			
PETROLEUM HYDROCARBONS (ug)								
TOTAL PETROLEUM HYDROCARBONS	0.08	0.48	0.50	0.09	0.14	0.03	0.06	
DEISEL RANGE ALKANES		0.30			0.07			

Table 4-1

Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 2 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	PSV-8 640657 8/25/2010	PSV-9 640652 8/24/2010	PSV-10 640664 8/25/2010	PSV-11 640658 8/26/2010	PSV-12 640651 8/26/2010	PSV-13 640665 8/25/2010	PSV-14 640659 8/26/2010	
VOLATILES (ug)								
1,2,4-TRIMETHYLBENZENE								
1,2-DICLOROBENZENE								
1,3,5-TRIMETHYLBENZENE								
2-METHYL NAPHTHALENE								
BENZENE	0.04	0.02	0.08	0.03	0.03	0.04	0.08	
BTEX	0.04	0.02	0.08	0.03	0.03	0.04	0.08	
CHLOROBENZENE								
CHLOROFORM								
CIS-&TRANS-1,2-DICHLOROETHENE								
CIS-1,2-DICHLOROETHENE								
ETHYLBENZENE								
M,P-XYLENE								
NAPH&2-MN								
NAPHTHALENE								
OCTANE								
O-XYLENE								
PENTADECANE								
TETRACHLOROETHENE								
TMBs ⁽¹⁾								
TOLUENE								
TRANS-1,2-DICHLOROETHENE						-		
TRICHLOROETHENE								
TRIDECANE								
UNDECANE	1.32				1.88		1.33	
PETROLEUM HYDROCARBONS (ug)								
TOTAL PETROLEUM HYDROCARBONS	1.65	0.12	0.10	0.15	2.53	0.23	1.67	
DEISEL RANGE ALKANES	1.32				1.88		1.33	

Table 4-1

Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 3 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	PSV-15 640650 8/27/2010	PSV-16 640663 8/25/201		PSV-17 640660 8/25/2010	PSV-18 640649 8/24/2010	PSV-19 640662 8/25/2010	PSV-20 640661 8/26/2010	PSV-21 640648 8/26/2010	
VOLATILES (ug)									_
1,2,4-TRIMETHYLBENZENE					0.04				
1,2-DICLOROBENZENE									
1,3,5-TRIMETHYLBENZENE									
2-METHYL NAPHTHALENE	0.04				0.02			0.06	
BENZENE	0.09	(.05	0.07	0.33	0.12	0.20	0.03	
BTEX	0.09	(.05	0.07	0.38	0.15	0.20	0.03	
CHLOROBENZENE									
CHLOROFORM									
CIS-&TRANS-1,2-DICHLOROETHENE									
CIS-1,2-DICHLOROETHENE									
ETHYLBENZENE									
M,P-XYLENE									
NAPH&2-MN	0.12				0.07			0.24	
NAPHTHALENE	0.09				0.05			0.18	
OCTANE					0.03				
O-XYLENE									
PENTADECANE									
TETRACHLOROETHENE									
TMBs ⁽¹⁾					0.04				
TOLUENE					0.05	0.03			
TRANS-1,2-DICHLOROETHENE									
TRICHLOROETHENE									
TRIDECANE	0.03				0.04				
UNDECANE	0.36				0.08		0.05	3.13	
PETROLEUM HYDROCARBONS (ug)									
TOTAL PETROLEUM HYDROCARBONS	9.65	(.17	5.40	24.15	2.09	0.77	59.19	
DEISEL RANGE ALKANES	0.39				0.11		0.05	3.13	

Table 4-1

Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 4 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	PSV-22 640621 8/26/2010	PSV-23 640640 8/24/2010	PSV-24 640641 8/27/2010	PSV-25 640622 8/25/2010	PSV-26 640639 8/25/2010		PSV-27 640642 8/27/2010	PSV-28 640629 8/27/2010	
VOLATILES (ug)					•				
1,2,4-TRIMETHYLBENZENE									
1,2-DICLOROBENZENE									
1,3,5-TRIMETHYLBENZENE									
2-METHYL NAPHTHALENE									
BENZENE	0.03	0.03	0.02	0.07	0.04	1	0.04	0.04	
BTEX	0.03	0.03	0.02	0.12	0.04	1	0.04	0.04	
CHLOROBENZENE									
CHLOROFORM									
CIS-&TRANS-1,2-DICHLOROETHENE									
CIS-1,2-DICHLOROETHENE									
ETHYLBENZENE									
M,P-XYLENE									
NAPH&2-MN									
NAPHTHALENE									
OCTANE									
O-XYLENE									
PENTADECANE									
TETRACHLOROETHENE									
TMBs ⁽¹⁾									
TOLUENE				0.05					
TRANS-1,2-DICHLOROETHENE									
TRICHLOROETHENE									
TRIDECANE									
UNDECANE				0.07			0.05		
PETROLEUM HYDROCARBONS (ug)									
TOTAL PETROLEUM HYDROCARBONS	0.05	0.23	0.46	0.59	0.04	1	0.10	0.04	
DEISEL RANGE ALKANES				0.07			0.05		

Table 4-1

Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 5 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	PSV-29 640638 8/27/2010	PSV-30 640643 8/26/2010	PSV-31 640630 8/26/2010	PSV-32 640637 8/26/2010	PSV-33 640644 8/26/2010	PSV-34 640631 8/27/2010	PSV-35 640636 8/26/2010
VOLATILES (ug)		'					
1,2,4-TRIMETHYLBENZENE							
1,2-DICLOROBENZENE							
1,3,5-TRIMETHYLBENZENE							
2-METHYL NAPHTHALENE							0.20
BENZENE	0.02	0.10	0.04	0.09	0.06	0.03	0.04
BTEX	0.02	0.10	0.04	0.09	0.06	0.03	0.04
CHLOROBENZENE							
CHLOROFORM							
CIS-&TRANS-1,2-DICHLOROETHENE							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
M,P-XYLENE							
NAPH&2-MN							0.31
NAPHTHALENE							0.11
OCTANE							
O-XYLENE							
PENTADECANE							0.03
TETRACHLOROETHENE							0.11
TMBs ⁽¹⁾							
TOLUENE							
TRANS-1,2-DICHLOROETHENE							
TRICHLOROETHENE							0.04
TRIDECANE							0.04
UNDECANE			0.09	0.69		0.06	
PETROLEUM HYDROCARBONS (ug)	·			 <u>-</u>			
TOTAL PETROLEUM HYDROCARBONS	0.02	0.14	0.16	2.41	2.35	0.10	4.91
DEISEL RANGE ALKANES			0.09	0.69		0.06	0.07

Table 4-1

Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 6 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	PSV-36 640645 8/27/2010	PSV-37 640632 8/25/2010	PSV-38 640635 8/24/2010	PSV-39 640646 8/26/2010	PSV-40 640633 8/26/2010	PSV-41 640634 8/25/2010	PSV-42 640647 8/25/2010
VOLATILES (ug)		•		•	<u> </u>	•	
1,2,4-TRIMETHYLBENZENE							0.06
1,2-DICLOROBENZENE							
1,3,5-TRIMETHYLBENZENE							0.05
2-METHYL NAPHTHALENE			0.54			0.39	0.06
BENZENE	0.22	0.02	0.04	0.05	0.08	0.08	0.52
BTEX	0.22	0.02	0.04	0.05	0.08	0.08	0.91
CHLOROBENZENE							
CHLOROFORM			0.02				
CIS-&TRANS-1,2-DICHLOROETHENE							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							0.05
M,P-XYLENE							0.08
NAPH&2-MN			0.76			0.81	0.09
NAPHTHALENE			0.21			0.42	0.03
OCTANE							3.19
O-XYLENE							0.05
PENTADECANE			0.03			0.04	
TETRACHLOROETHENE	0.03		0.18			0.06	
TMBs ⁽¹⁾							0.11
TOLUENE							0.22
TRANS-1,2-DICHLOROETHENE							
TRICHLOROETHENE	0.03		0.10				
TRIDECANE			0.03			0.05	0.26
UNDECANE						0.05	0.59
PETROLEUM HYDROCARBONS (ug)							
TOTAL PETROLEUM HYDROCARBONS	0.35	0.70	4.13	1.41	8.60	11.46	132.14
DEISEL RANGE ALKANES			0.05			0.13	0.85

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Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 7 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	PSV-43 640564 8/25/2010	PSV-44 640563 8/24/2010	PSV-45 640562 8/26/2010	PSV-46 640565 8/24/2010	PSV-47 640566 8/25/2010	PSV-48 640567 8/24/2010	PSV-49 640570 8/25/2010
VOLATILES (ug)							
1,2,4-TRIMETHYLBENZENE		0.15	0.03		0.15	0.43	
1,2-DICLOROBENZENE							
1,3,5-TRIMETHYLBENZENE		0.25			0.08	1.01	
2-METHYL NAPHTHALENE		0.55			0.05	0.11	
BENZENE	0.07	0.13	0.19	0.16	0.22	0.34	0.17
BTEX	0.09	0.96	0.45	0.16	0.63	1.29	0.17
CHLOROBENZENE							
CHLOROFORM							
CIS-&TRANS-1,2-DICHLOROETHENE		3.20	0.07			0.04	
CIS-1,2-DICHLOROETHENE		3.01	0.07			0.04	
ETHYLBENZENE		0.05				0.11	
M,P-XYLENE		0.22	0.03		0.24	0.23	
NAPH&2-MN		0.75	0.03	0.02	0.08	0.18	
NAPHTHALENE		0.20	0.03	0.02	0.03	0.07	
OCTANE		0.05		0.04	0.14	1.40	
O-XYLENE		0.36	0.03		0.15	0.40	
PENTADECANE				0.03			0.06
TETRACHLOROETHENE							
TMBs ⁽¹⁾		0.40	0.03		0.23	1.44	
TOLUENE	0.02	0.19	0.19		0.02	0.22	
TRANS-1,2-DICHLOROETHENE		0.18					
TRICHLOROETHENE	0.08	2.07	0.19		0.32	0.04	0.08
TRIDECANE	0.03	0.12	0.06	0.07	0.11	0.07	0.13
UNDECANE		0.25		0.14	0.15	0.21	0.09
PETROLEUM HYDROCARBONS (ug)							
TOTAL PETROLEUM HYDROCARBONS	16.46	39.64	48.68	70.03	64.47	256.41	14.28
DEISEL RANGE ALKANES	0.03	0.37	0.06	0.24	0.26	0.28	0.28

Table 4-1

Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 8 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	PSV-50 640569 8/24/2010	PSV-51 640568 8/25/2010	PSV-52 640571 8/26/2010	PSV-53 640572 8/25/2010	PSV-54 640573 8/25/2010	PSV-55 640574 8/26/2010	PSV-56 640575 8/25/2010	
VOLATILES (ug)			•			_ '		_
1,2,4-TRIMETHYLBENZENE		0.03			0.65			
1,2-DICLOROBENZENE								
1,3,5-TRIMETHYLBENZENE					2.51			
2-METHYL NAPHTHALENE					0.04			
BENZENE	0.06	0.18	0.11	0.08	0.30	0.09	0.11	
BTEX	0.09	0.23	0.11	0.08	3.95	0.09	0.14	
CHLOROBENZENE								
CHLOROFORM								
CIS-&TRANS-1,2-DICHLOROETHENE					0.35		0.61	
CIS-1,2-DICHLOROETHENE					0.35		0.38	
ETHYLBENZENE					1.04			
M,P-XYLENE					1.96			
NAPH&2-MN		0.03			0.12			
NAPHTHALENE		0.03			0.07			
OCTANE					0.09			
O-XYLENE		0.02			0.59			
PENTADECANE								
TETRACHLOROETHENE								
TMBs ⁽¹⁾		0.03			3.16			
TOLUENE	0.03	0.03			0.06		0.04	
TRANS-1,2-DICHLOROETHENE							0.23	
TRICHLOROETHENE		0.02			0.06		0.26	
TRIDECANE		0.10		0.02	0.05			
UNDECANE	0.07	0.08			0.26			
PETROLEUM HYDROCARBONS (ug)		_			_	_		
TOTAL PETROLEUM HYDROCARBONS	30.34	52.48	0.07	0.17	137.02	0.18	20.83	
DEISEL RANGE ALKANES	0.07	0.18		0.02	0.30			

Table 4-1

Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 9 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	PSV-57 640576 8/25/2010	PSV-58 640577 8/25/2010	PSV-59 640578 8/25/2010	PSV-60 640579 8/25/2010	PSV-61 640582 8/26/2010	PSV-62 640581 8/25/2010	PSV-63 640580 8/25/2010
VOLATILES (ug)							
1,2,4-TRIMETHYLBENZENE		0.02		1.95			
1,2-DICLOROBENZENE							
1,3,5-TRIMETHYLBENZENE				0.55			
2-METHYL NAPHTHALENE		0.09					
BENZENE	0.07	0.09	0.17	0.25	0.09	0.04	0.08
BTEX	0.07	0.09	0.17	31.86	0.09	0.04	0.16
CHLOROBENZENE				0.15			
CHLOROFORM							
CIS-&TRANS-1,2-DICHLOROETHENE	0.45		0.63	2.36			
CIS-1,2-DICHLOROETHENE	0.38		0.51	2.19			
ETHYLBENZENE				0.62			0.03
M,P-XYLENE				29.68			
NAPH&2-MN		0.14		0.03			
NAPHTHALENE		0.05		0.03			
OCTANE				7.92			0.02
O-XYLENE				0.79			
PENTADECANE							
TETRACHLOROETHENE				0.13			
TMBs ⁽¹⁾		0.02		2.50			
TOLUENE				0.52			0.05
TRANS-1,2-DICHLOROETHENE	0.07		0.12	0.17			
TRICHLOROETHENE	0.05		0.05	8.58			
TRIDECANE							
UNDECANE				0.07			
PETROLEUM HYDROCARBONS (ug)							
TOTAL PETROLEUM HYDROCARBONS	23.58	6.12	2.19	173.35	0.12	0.11	5.64
DEISEL RANGE ALKANES				0.07			

Table 4-1

Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 10 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	PSV-64 640584 8/26/2010	PSV-65 640585 8/24/2010	PSV-66 640586 8/26/2010	PSV-67 640587 8/26/2010	PSV-69 640588 8/25/2010	PSV-70 640589 8/26/2010	PSV-71 640590 8/26/2010
VOLATILES (ug)		<u> </u>		•	•	<u> </u>	
1,2,4-TRIMETHYLBENZENE				7	.44 0.10	0.18	
1,2-DICLOROBENZENE							
1,3,5-TRIMETHYLBENZENE				9	.56 0.17	0.25	
2-METHYL NAPHTHALENE				0	.02 0.55		0.02
BENZENE	0.04	0.02		0	.14 0.24	1.07	0.05
BTEX	0.04	0.02		151	.99 0.63	2.18	0.11
CHLOROBENZENE							
CHLOROFORM							
CIS-&TRANS-1,2-DICHLOROETHENE	0.21			0	.17 1.53	7.44	
CIS-1,2-DICHLOROETHENE	0.17			0	.17 1.35	6.89	
ETHYLBENZENE				4	.23	0.23	
M,P-XYLENE				146	.95 0.13	0.28	
NAPH&2-MN				0	.05 2.40	0.04	0.09
NAPHTHALENE				0	.03 1.85	0.04	0.07
OCTANE				2	.93 0.29	8.95	
O-XYLENE				0	.50 0.19	0.20	
PENTADECANE							
TETRACHLOROETHENE					.03		
TMBs ⁽¹⁾				17	.00 0.26	0.43	
TOLUENE				0	.17 0.06		0.07
TRANS-1,2-DICHLOROETHENE	0.05				0.18	0.55	
TRICHLOROETHENE	0.76			0	.21 1.53	9.91	0.53
TRIDECANE					0.02		
UNDECANE		0.19			0.07	0.14	
PETROLEUM HYDROCARBONS (ug)							
TOTAL PETROLEUM HYDROCARBONS	1.33	0.61	0.15	212	.97 67.30	340.83	0.40
DEISEL RANGE ALKANES		0.19			0.09	0.14	

Table 4-1

Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 11 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	PSV-72 640593 8/26/2010	PSV-73 640592 8/26/2010	PSV-74 640591 8/25/2010	PSV-75 640594 8/25/2010	PSV-76 640595 8/26/2010	PSV-77 640596 8/25/2010	PSV-78 640599 8/25/2010
VOLATILES (ug)		•	•	•	•	•	<u>. </u>
1,2,4-TRIMETHYLBENZENE	0.03			0.55	7.16	0.20	1.04
1,2-DICLOROBENZENE							
1,3,5-TRIMETHYLBENZENE	0.05	0.06		2.38	1.15	0.18	1.55
2-METHYL NAPHTHALENE			0.42	0.06	0.88	0.07	
BENZENE	0.55	0.66	0.03	0.75	3.45	0.43	0.25
BTEX	0.88	1.21	0.20	3.51	13.71	1.32	2.95
CHLOROBENZENE							
CHLOROFORM							
CIS-&TRANS-1,2-DICHLOROETHENE	1.06	0.82	0.43	87.31	0.14		0.03
CIS-1,2-DICHLOROETHENE	0.92	0.73	0.36	73.12	0.14		0.03
ETHYLBENZENE	0.04	0.05		0.17	2.90	0.04	1.90
M,P-XYLENE	0.09	0.19	0.05	0.67	4.40	0.22	0.70
NAPH&2-MN			0.87	0.12	1.95	0.32	
NAPHTHALENE			0.45	0.07	1.07	0.25	
OCTANE	0.10	2.45		2.83	5.82	0.09	0.06
O-XYLENE	0.10	0.18	0.02	1.27	1.72	0.16	0.09
PENTADECANE					2.08	0.12	
TETRACHLOROETHENE				0.29			
TMBs ⁽¹⁾	0.07	0.06		2.93	8.31	0.38	2.59
TOLUENE	0.10	0.13	0.10	0.65	1.25	0.48	0.02
TRANS-1,2-DICHLOROETHENE	0.14	0.10	0.07	14.19			
TRICHLOROETHENE	0.82	0.12	1.00	51.51	0.03	0.07	0.04
TRIDECANE	0.08			0.07	3.60	0.63	
UNDECANE	0.54			0.38	2.96	0.92	
PETROLEUM HYDROCARBONS (ug)							
TOTAL PETROLEUM HYDROCARBONS	86.27	209.26	2.60	274.98	536.14	89.32	26.89
DEISEL RANGE ALKANES	0.61			0.46	8.64	1.67	

Table 4-1

Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 12 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	PSV-79 640598 8/27/2010	PSV-80 640597 8/26/2010	PSV-81 640601 8/26/2010	PSV-82 640600 8/25/2010	PSV-83 640605 8/26/2010	PSV-84 640603 8/24/2010	PSV-85 640602 8/25/2010
VOLATILES (ug)		<u> </u>			<u> </u>	<u> </u>	
1,2,4-TRIMETHYLBENZENE	0.06			0.39			
1,2-DICLOROBENZENE							
1,3,5-TRIMETHYLBENZENE	0.05			0.89	0.05		
2-METHYL NAPHTHALENE				0.22			
BENZENE	0.18	0.05	1.91	0.21	0.22	0.05	0.03
BTEX	1.54	0.26	4.38	0.88	0.43	0.05	0.03
CHLOROBENZENE							
CHLOROFORM							
CIS-&TRANS-1,2-DICHLOROETHENE			0.46		0.35		
CIS-1,2-DICHLOROETHENE			0.38		0.28		
ETHYLBENZENE	0.13		0.84	0.13	0.02		
M,P-XYLENE	0.40	0.09	1.16	0.31	0.10		
NAPH&2-MN				0.36			
NAPHTHALENE				0.15			
OCTANE	1.54		16.55	0.68	0.06		
O-XYLENE	0.09	0.06	0.19	0.19	0.05		
PENTADECANE				0.05			
TETRACHLOROETHENE							
TMBs ⁽¹⁾	0.10			1.28	0.05		
TOLUENE	0.74	0.06	0.27	0.05	0.04		
TRANS-1,2-DICHLOROETHENE			0.07		0.07		
TRICHLOROETHENE			0.02	0.04	0.27		
TRIDECANE		0.03		0.57			
UNDECANE		0.26	0.04	1.33		0.11	0.35
PETROLEUM HYDROCARBONS (ug)							
TOTAL PETROLEUM HYDROCARBONS	95.60	18.27	226.73	145.51	14.05	1.11	0.61
DEISEL RANGE ALKANES		0.29	0.04	1.95		0.11	0.35

Table 4-1

Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 13 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	PSV-86 640606 8/26/2010	PSV-87 640604 8/25/2010	PSV-88 640608 8/26/2010	PSV-89 640607 8/25/2010	PSV-90 640611 8/24/2010	PSV-91 640610 8/25/2010	PSV-92 640609 8/26/2010
VOLATILES (ug)		-				•	
1,2,4-TRIMETHYLBENZENE							
1,2-DICLOROBENZENE							
1,3,5-TRIMETHYLBENZENE							
2-METHYL NAPHTHALENE		0.03		0.04			0.03
BENZENE	0.08	0.10	0.09	0.08	0.08	0.10	0.11
BTEX	0.18	0.10	0.12	0.10	0.10	0.10	0.22
CHLOROBENZENE							
CHLOROFORM							
CIS-&TRANS-1,2-DICHLOROETHENE	0.27			0.08			0.12
CIS-1,2-DICHLOROETHENE	0.27			0.08			0.12
ETHYLBENZENE							
M,P-XYLENE	0.05						0.05
NAPH&2-MN		0.08		0.09			0.07
NAPHTHALENE		0.05		0.04			0.04
OCTANE							
O-XYLENE	0.02						0.03
PENTADECANE							
TETRACHLOROETHENE							
TMBs ⁽¹⁾							
TOLUENE	0.03		0.03	0.02	0.02		0.03
TRANS-1,2-DICHLOROETHENE							
TRICHLOROETHENE	1.47			0.04		0.28	0.05
TRIDECANE							
UNDECANE		1.09	0.70	0.35	0.25		
PETROLEUM HYDROCARBONS (ug)							
TOTAL PETROLEUM HYDROCARBONS	2.32	1.72	1.08	1.56	1.19	1.39	1.29
DEISEL RANGE ALKANES		1.09	0.70	0.35	0.25		

Table 4-1

Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 14 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:		PSV-94 640613 8/27/2010	PSV-95 640614 8/24/2010	PSV-96 640617 8/26/2010	PSV-97 640616 8/27/2010	PSV-98 640615 8/26/2010	PSV-99 640618 8/26/2010
VOLATILES (ug)				•	•		•
1,2,4-TRIMETHYLBENZENE							
1,2-DICLOROBENZENE							
1,3,5-TRIMETHYLBENZENE							
2-METHYL NAPHTHALENE							
BENZENE	0.05	0.12	0.08	0.22	0.04	0.08	0.10
BTEX	0.05	0.12	0.08	0.22	0.04	0.08	0.10
CHLOROBENZENE							
CHLOROFORM							
CIS-&TRANS-1,2-DICHLOROETHENE							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
M,P-XYLENE							
NAPH&2-MN							
NAPHTHALENE							
OCTANE							
O-XYLENE							
PENTADECANE							
TETRACHLOROETHENE							
TMBs ⁽¹⁾							
TOLUENE							
TRANS-1,2-DICHLOROETHENE							
TRICHLOROETHENE	0.03	0.03		0.03			
TRIDECANE							
UNDECANE					0.06		
PETROLEUM HYDROCARBONS (ug)							
TOTAL PETROLEUM HYDROCARBONS	0.23	0.17	0.18	0.14	0.24	0.22	0.06
DEISEL RANGE ALKANES					0.06		

Table 4-1

Chemical Results of Passive Soil Gas Survey, August 2010 Dump Road Area Lockheed Martin Martin State Airport, Middle River, Maryland Page 15 of 15

FIELD SAMPLE ID: LAB ID: SAMPLE DATE:	640619	PSV-101 640620 8/25/2010
VOLATILES (ug)		
1,2,4-TRIMETHYLBENZENE		
1,2-DICLOROBENZENE	0.02	
1,3,5-TRIMETHYLBENZENE		
2-METHYL NAPHTHALENE		
BENZENE		0.04
BTEX		0.04
CHLOROBENZENE		
CHLOROFORM		
CIS-&TRANS-1,2-DICHLOROETHENE		
CIS-1,2-DICHLOROETHENE		
ETHYLBENZENE		
M,P-XYLENE		
NAPH&2-MN		
NAPHTHALENE		
OCTANE		
O-XYLENE		
PENTADECANE		
TETRACHLOROETHENE		
TMBs ⁽¹⁾		
TOLUENE		
TRANS-1,2-DICHLOROETHENE		
TRICHLOROETHENE		0.10
TRIDECANE		
UNDECANE		0.44
PETROLEUM HYDROCARBONS (ug)		
TOTAL PETROLEUM HYDROCARBONS		0.79
DEISEL RANGE ALKANES		0.44

^{-- -} Not detected at listed detection limit.

ug - micrograms.

Table 4-2

Results for Single-Well Permeability Tests (Slug Tests), August 2010

Dump Road Area

Lockheed Martin Martin State Airport, Middle River, Maryland

Hydraulic Conductivity						
			,	Geometric	Arithmetic	
	Test 1 ¹	Test 2 ¹	Test 3 ²	Mean	Mean	
Well ID	(Ft/day) ³	(Ft/day)	(Ft/day)	(Ft/day)	(Ft/day)	
Upper Surficial A						
MW24S	1.10	1.17		1.13	1.14	
Intermediate Sur	ficial Aquifer					
DMW7I ⁽⁴⁾	27.2	27.1	27.0	27.1	27.1	
MW24I	64.3	67.7		66.0	66.0	
MW32I	13.4	13.0		13.2	13.2	
MW34I	1.96	1.93		1.94	1.95	
Average (Geo	metric / Arithmetic	2)		14.6	27.1	
Lower Surficial A	Aquifer					
DMW8D ⁽⁴⁾	9.36	9.67		9.51	9.52	
MW15D	25.4	25.5		25.4	25.5	
MW16D	4.31	4.29		4.30	4.30	
MW18D	2.74	2.75		2.74	2.75	
MW19D	19.2	19.3	19.3	19.3	19.3	
MW20D	18.2	18.4	18.7	18.4	18.4	
MW21D	3.21	3.24	3.31	3.25	3.25	
MW22D	4.37	4.74		4.55	4.56	
MW23D	14.3	14.5		14.4	14.4	
Average (Geor	netric / Arithmetic	8.4	11.3			
Non-Surficial Aquifer						
MW14D	0.576	0.603		0.589	0.590	
MW26D	0.033			0.033	0.033	
MW17D	6.68E-05			6.68E-05	6.68E-05	

¹ Water level data for Test 1 and Test 2 were recorded at 0.5 or 1 second intervals. A 30 second interval was used for MW17D due to a slow groundwater response.

² Water level data for Test 3 were recorded using a logarithmic interval setting.

³ Ft/d = Feet per day.

⁴ Results for the 2003 slug test analyses were 6.5 ft/day for DMW7I and 20 ft/day for DMW8D (Tetra Tech, 2010).

Table 4-3

Groundwater Levels and Elevations - July 2010

Lockheed Martin, Martin State Airport, Middle River, Maryland
Page 1 of 3

	Aquifer	Top of Well Casing Elevation Feet	Depth to Groundwater 7/2/2010 Feet	Groundwater Elevation 7/2/2010 Feet	
Well ID	Level	(NAVD 1988)	(Below Top of Casing)	(NAVD 1988)	
DMW-1S	S	11.08	9.22	1.86	
DMW-2S	S	21.75	21.29	0.46	
DMW-3S	S	16.52	10.86	5.66	
DMW-4S	S	20.52	20.29	0.23	
DMW-5S	S	21.34	20.99	0.35	
DMW-6S	S	18.62	18.39	0.23	
DMW-7S	S	21.84	NM		
DMW-8S	S	15.80	12.60	3.20	
DMW-9S	S	11.45	9.85	1.60	
MW-10S	S	10.29	8.39	1.90	
MW-11S	S	9.20	5.69	3.51	
MW-15S	S	8.60	7.22	1.38	
MW-16S	S	10.20	9.73	0.47	
MW-17S	S	7.61	7.16	0.45	
MW-18S	S	8.89	8.56	0.33	
MW-20S	S	12.44	10.89	1.55	
MW-23S	S	10.01	8.29	1.72	
MW-24S	S	7.72	4.81	2.91	
MW-25S	S	9.69	6.23	3.46	
MW-26S	S	11.72	9.47	2.25	
MW-32S	S	7.27	6.31	0.96	
MW-33S	S	9.97	7.84	2.13	
MW-34S	S	7.44	5.77	1.67	
MW-3	S	11.19	9.21	1.98	
MW-4	S	10.34	8.59	1.75	
MW-5	S	22.65	21.77	0.88	
MW-6	S	15.72	15.14	0.58	
MW-7	S	10.90	7.36	3.54	
OW1-S	S	19.17	18.57	0.60	
RW1-S	S	19.09	18.45	0.64	
DMW-1A	I	12.05	10.45	1.60	
MW-2	I	8.40	7.46	0.94	
DMW-2A	I	21.65	21.25	0.40	
DMW-3I	I	16.45	15.95	0.50	
DMW-4I	I	20.48	20.03	0.45	

Table 4-3

Groundwater Levels and Elevations - July 2010
Lockheed Martin, Martin State Airport, Middle River, Maryland
Page 2 of 3

	Aquifer	Top of Well Casing Elevation Feet	Depth to Groundwater 7/2/2010 Feet	Groundwater Elevation 7/2/2010 Feet
Well ID	Level	(NAVD 1988)	(Below Top of Casing)	(NAVD 1988)
DMW-5I	I	21.39	21.03	0.36
DMW-6I	I	18.64	18.26	0.38
DMW-7I	I	21.90	21.32	0.58
DMW-8I	I	16.30	15.47	0.83
DMW-9I	I	11.40	9.92	1.48
MW-1 ⁽¹⁾	I	11.08	NM	
MW-10I	I	10.27	8.56	1.71
MW-11I	I	9.15	7.29	1.86
MW-14I	I	11.72	11.29	0.43
MW-15I	I	8.79	7.19	1.60
MW-16I	I	10.06	8.66	1.40
MW-17I	I	7.68	6.51	1.17
MW-18I	I	8.91	8.62	0.29
MW-19I	I	7.90	7.17	0.73
MW-20I	I	12.39	10.82	1.57
MW-21I	I	10.83	9.21	1.62
MW-22I	I	11.01	9.12	1.89
MW-23I	I	10.07	8.37	1.70
MW-24I	I	7.68	5.96	1.72
MW-25I	I	9.72	7.83	1.89
MW-26I	I	11.67	9.98	1.69
MW-28I	I	8.65	7.18	1.47
MW-32I	I	7.28	6.40	0.88
MW-33I	I	10.02	7.94	2.08
MW-34I	I	7.37	5.72	1.65
OW1-I	I	18.05	17.73	0.32
RW1-I	I	18.44	18.11	0.33
DMW-1B	D	12.04	10.71	1.33
DMW-2B	D	21.66	21.04	0.62
DMW-3D	D	16.46	15.96	0.50
DMW-4D	D	20.44	20.06	0.38
DMW-5D	D	21.38	21.00	0.38
DMW-6D	D	18.51	18.21	0.30
DMW-7D	D	21.94	21.23	0.71
DMW-8D	D	16.35	15.46	0.89

Groundwater Levels and Elevations - July 2010 Lockheed Martin, Martin State Airport, Middle River, Maryland Page 3 of 3

Table 4-3

Well ID	Aquifer Level	Top of Well Casing Elevation Feet (NAVD 1988)	Depth to Groundwater 7/2/2010 Feet (Below Top of Casing)	Groundwater Elevation 7/2/2010 Feet (NAVD 1988)
DMW-9D	D	11.41	10.29	1.12
MW-15D	D	8.77	7.17	1.60
MW-16D	D	10.22	9.84	0.38
MW-17D	D	7.56	5.41	2.15
MW-18D	D	8.88	8.41	0.47
MW-19D	D	7.94	7.16	0.78
MW-20D	D	12.40	11.38	1.02
MW-21D	D	10.78	9.61	1.17
MW-22D	D	11.02	9.61	1.41
MW-23D	D	10.03	8.82	1.21
MW-26D	D	11.66	9.92	1.74
MW-14D	DD	11.56	7.97	3.59
MW-27D	DD	8.39	5.02	3.37
MW-29D	DD	11.43	11.05	0.38
MW-30D	DD	8.26	7.37	0.89
MW-31D	DD	6.95	6.78	0.17

^{(1) =} Well has been sealed and abandoned.

S = Upper surficial aquifer

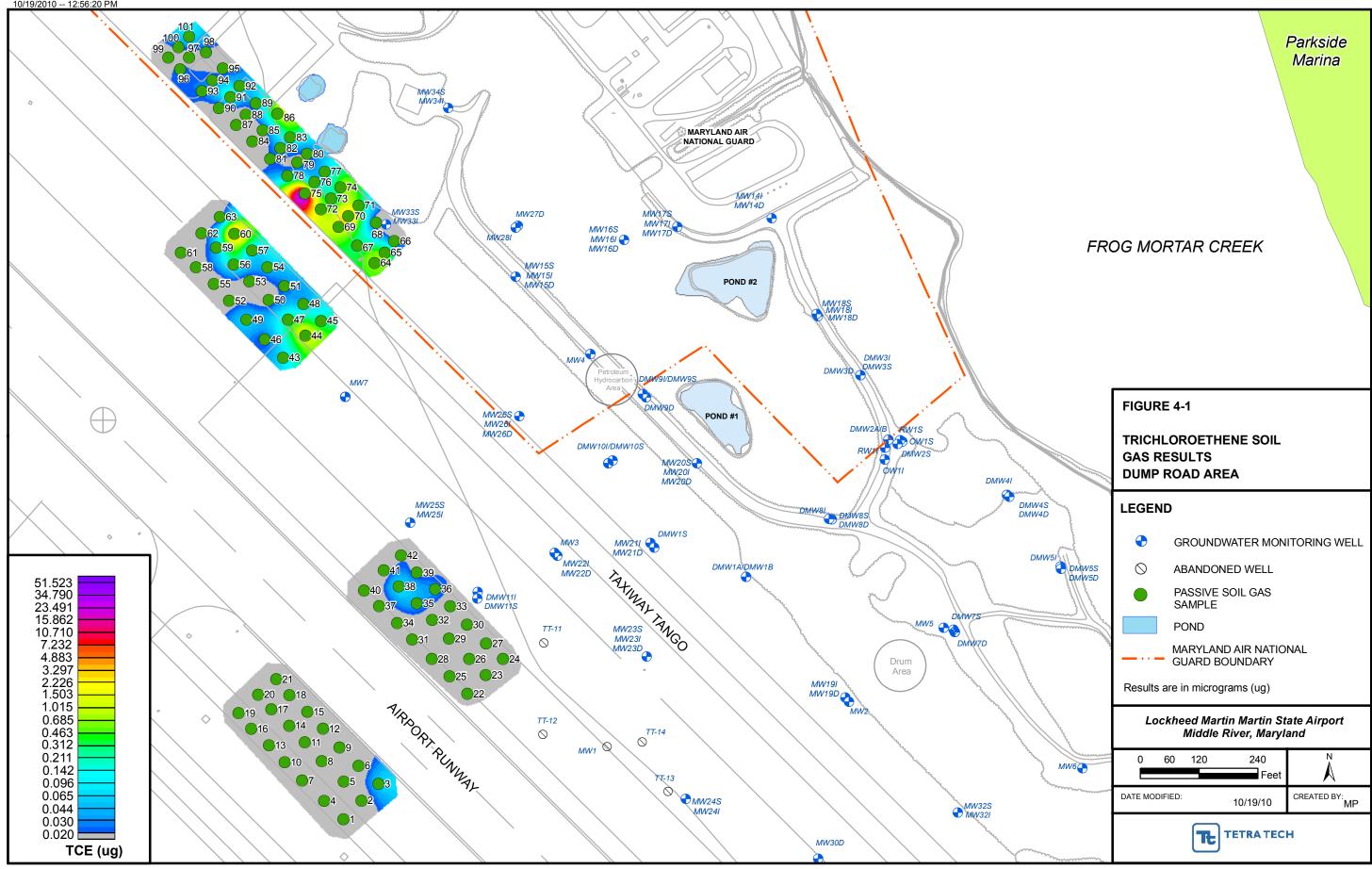
I = Intermediate surficial aquifer

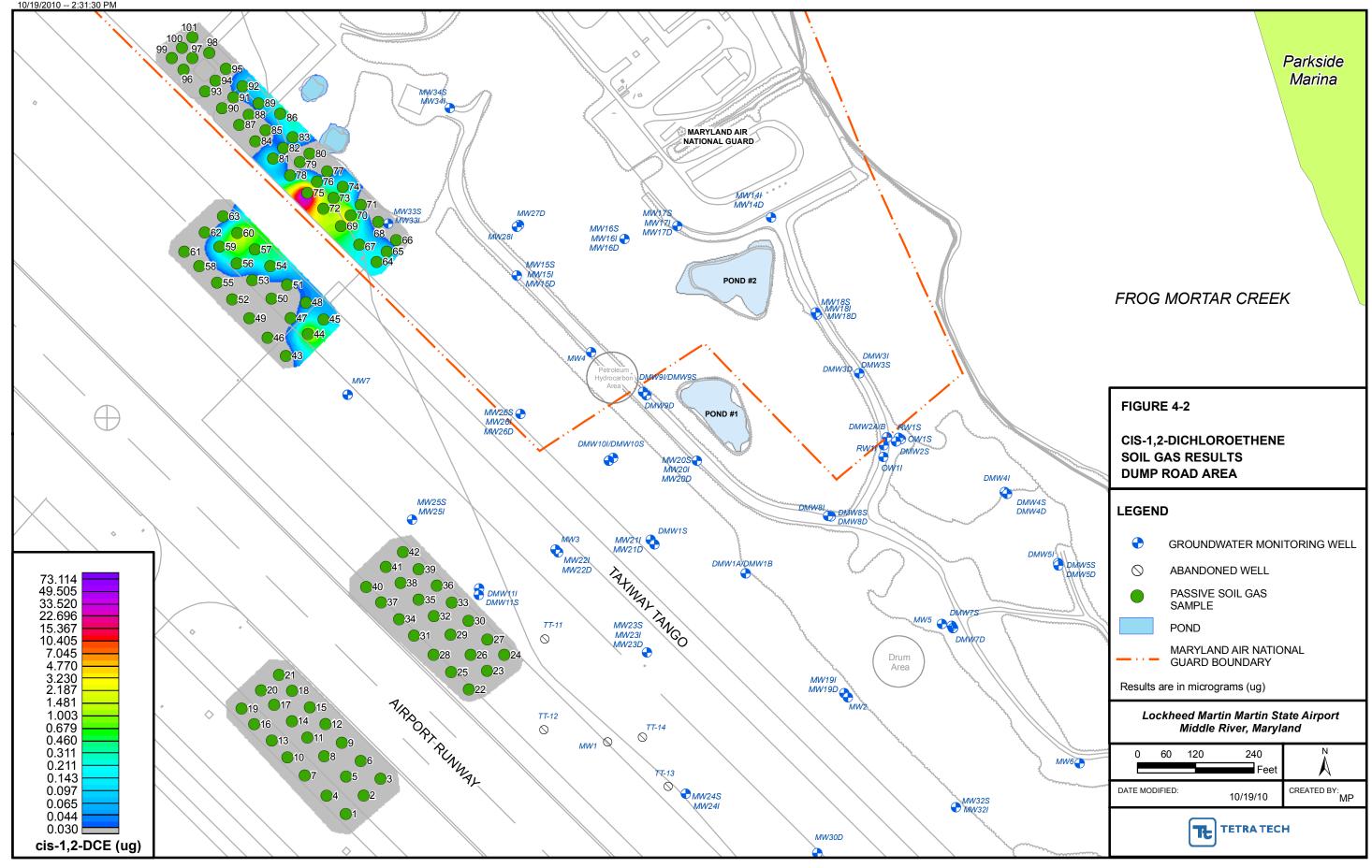
D = Lower surficial aquifer

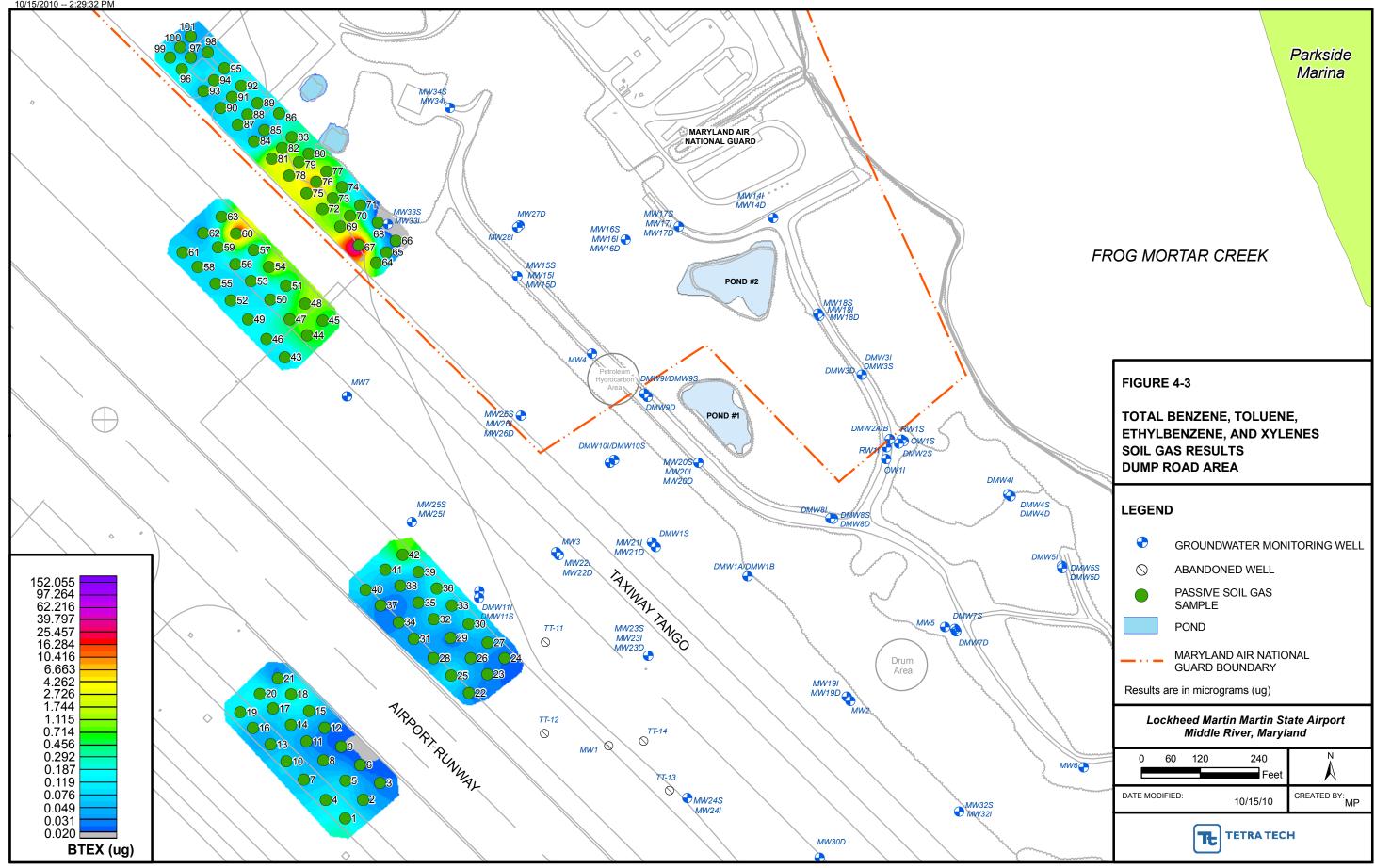
DD = Deep confined aquifer

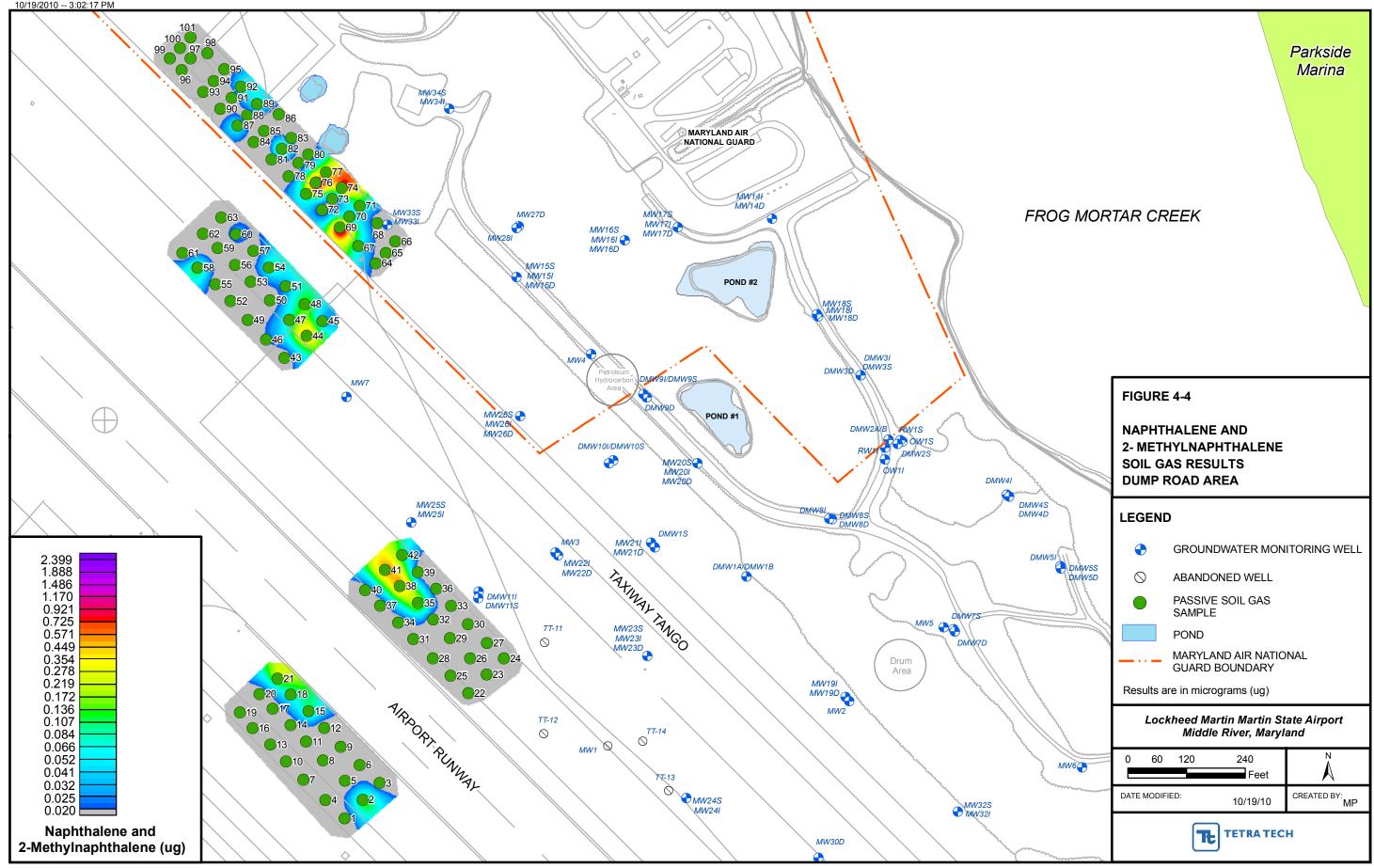
NM = Not measured

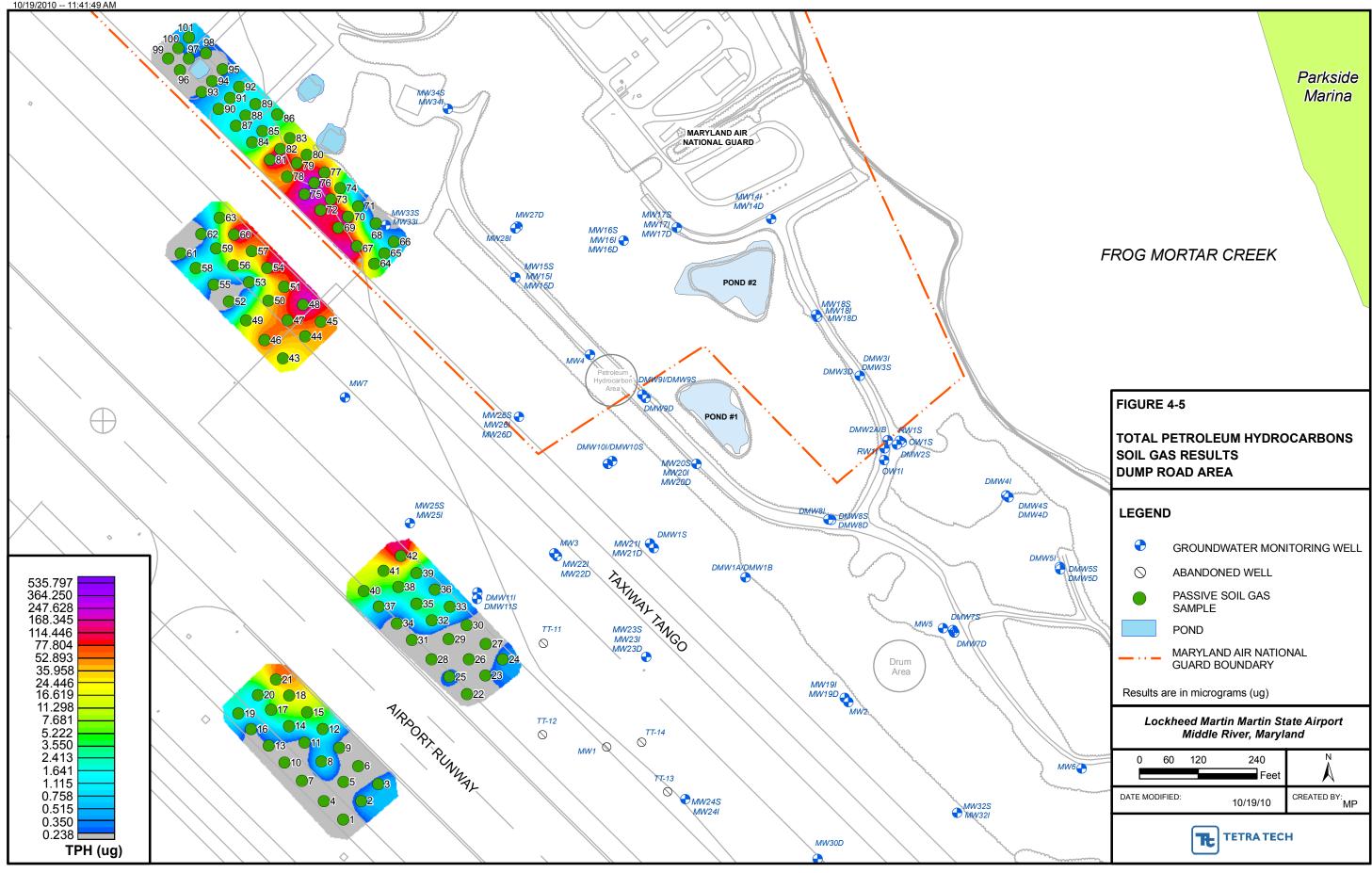
NAVD = North American Vertical Datum

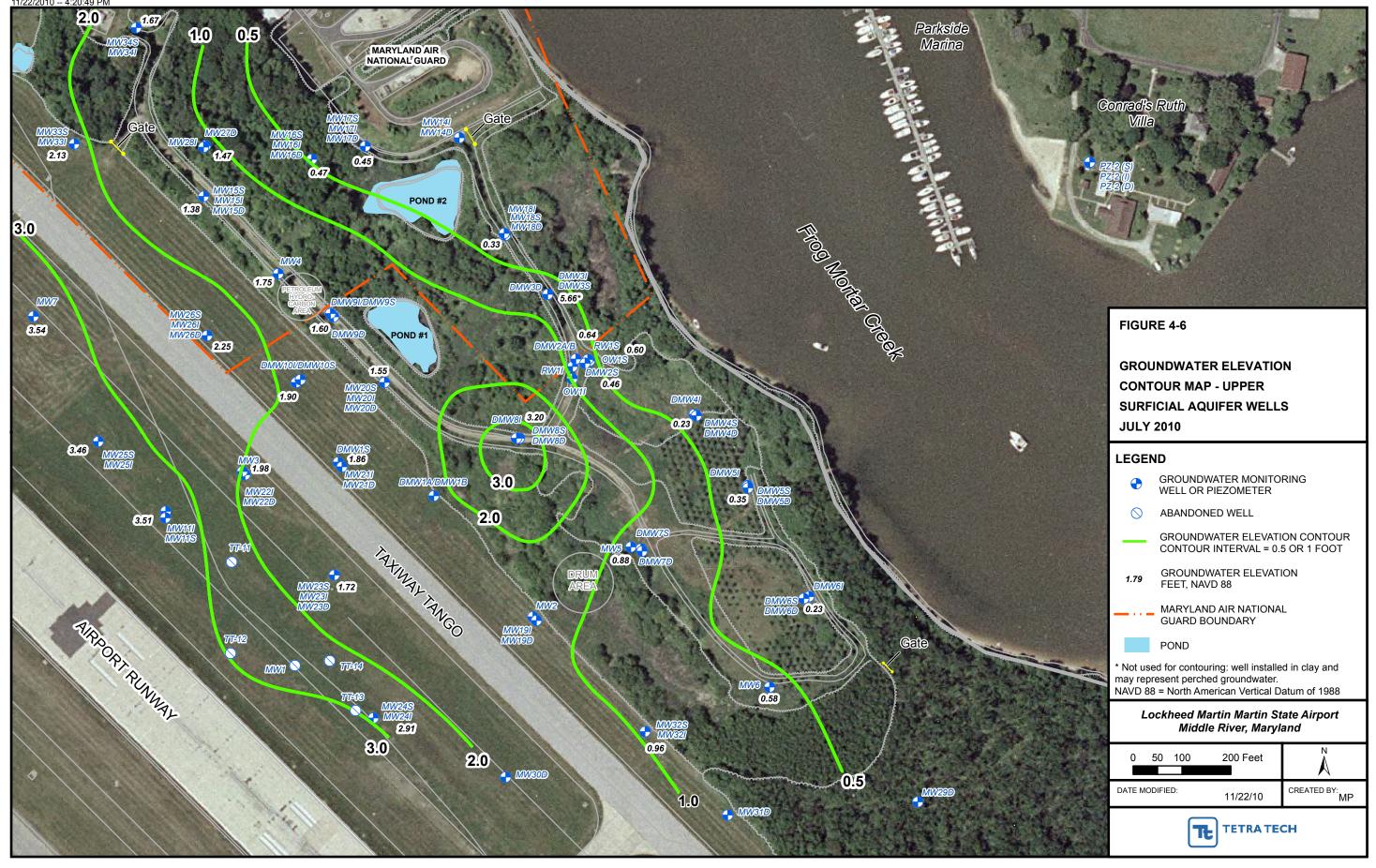


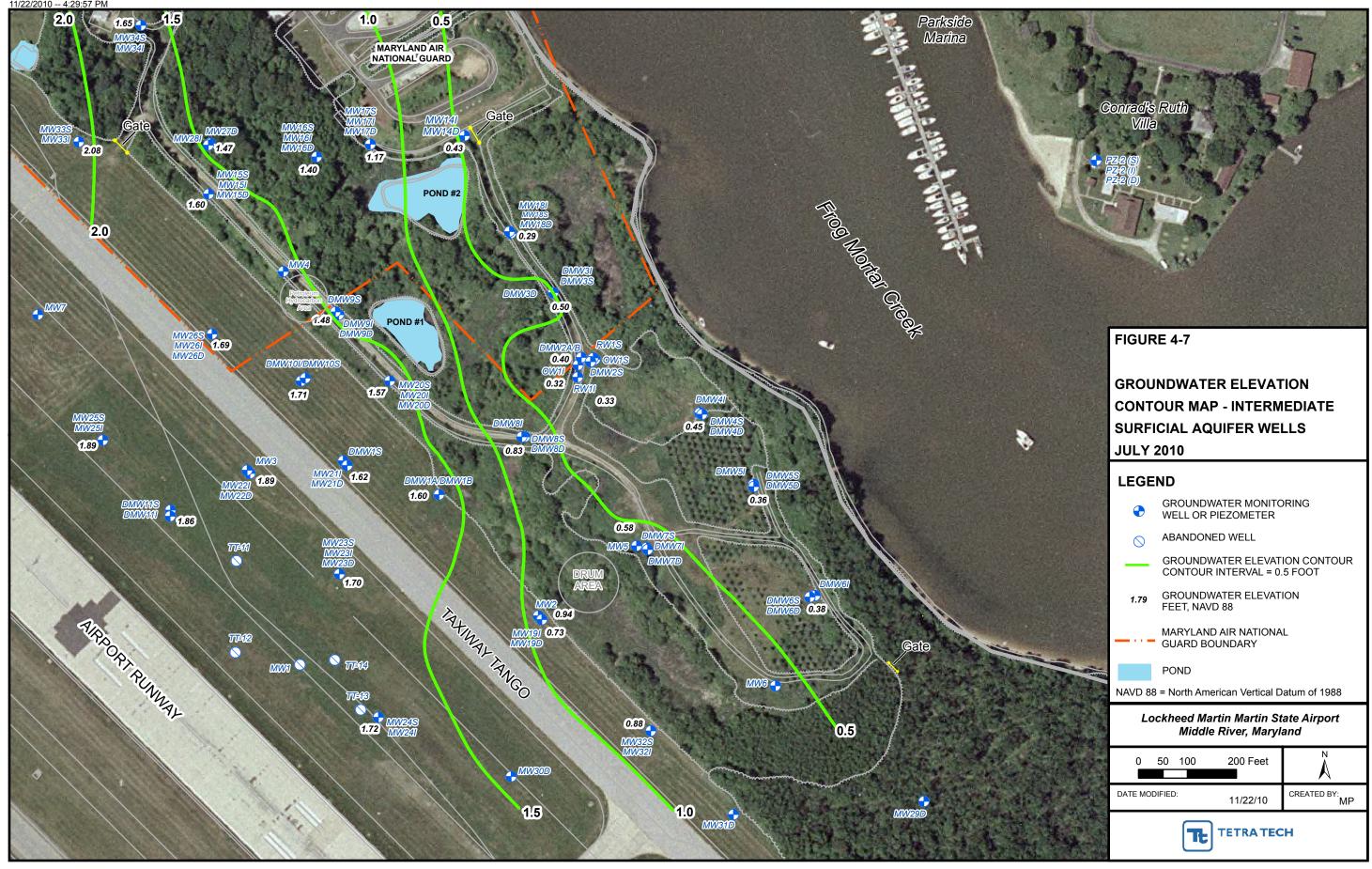


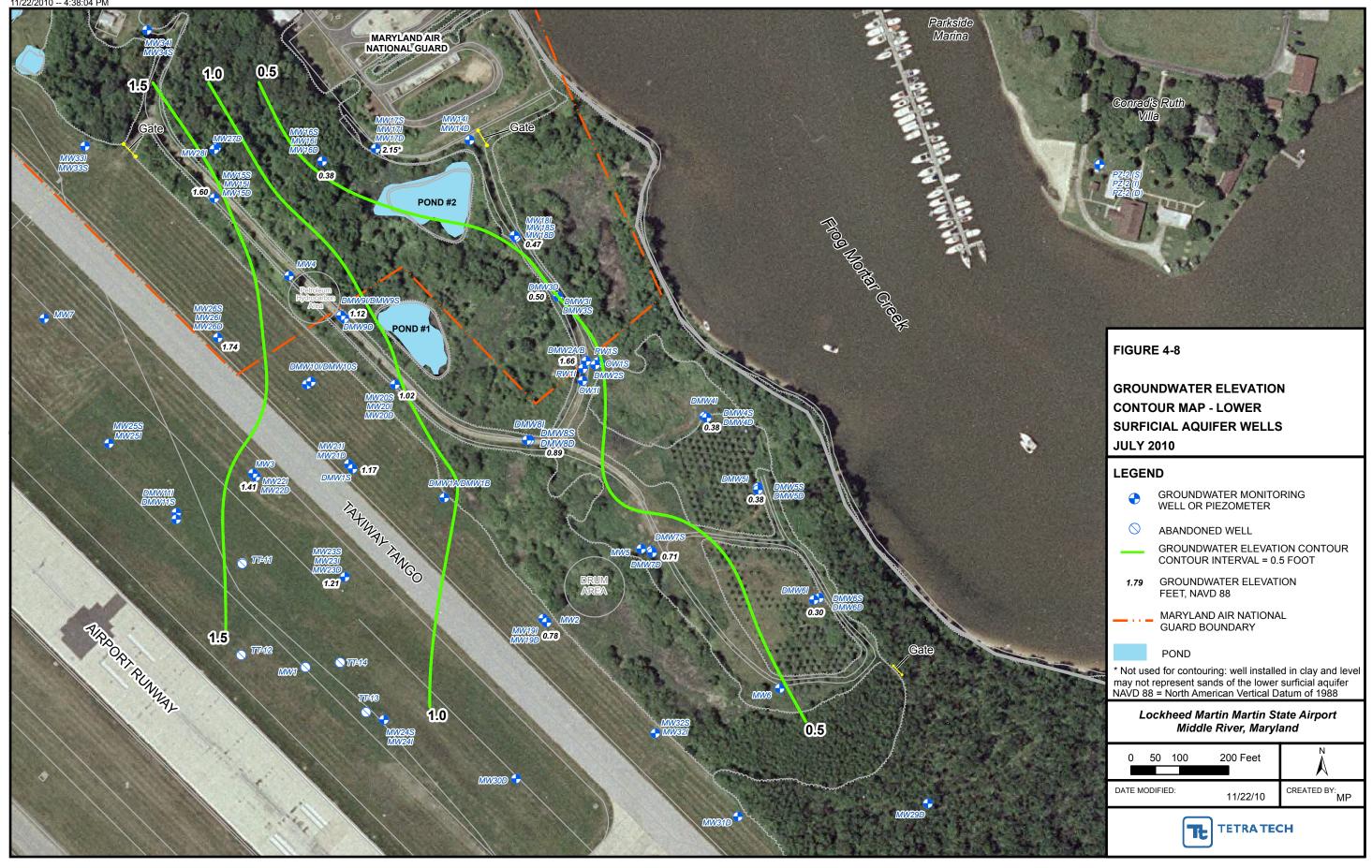














Section 5 Summary

A supplemental study was conducted at the Dump Road Area of MSA in 2010 to fill data gaps and provide additional information to complete a remedial design to restore soil and groundwater. These supplemental activities include site access and utility clearance, topographic mapping, wetland identification and mapping, passive soil-gas sampling and analysis, aquifer hydraulics testing, synoptic and long-term groundwater level monitoring, geophysical surveying, and groundwater modeling. Results of the wetlands delineation (Tetra Tech, 2010d), long-term groundwater monitoring (Tetra Tech 2010e), and groundwater modeling update (Tetra Tech, 2010f) are provided in documents separate from this supplemental report.

The following summarizes the 2010 supplemental activities:

- Topographical and wetlands delineation surveys of the Dump Road Area were conducted from the eastern side of Taxiway Tango to the western shoreline of Frog Mortar Creek. The northern limit of the survey is near the access to the MANG Jet Engine Test Pad from Taxiway Tango. Two topographical maps are provided using a 1:70 scale, and a one-foot topographic-contour interval. The wetland survey will evaluate potential reduction or increase in wetland functions and values associated with any remediation project, as well as the value of any wetland functions that may need to be replaced for compensatory mitigation.
- Passive soil-gas sampling was conducted near Taxiway Tango and the airport runway northwest, west, and southwest of wells DMW11S and MW33S, where VOC concentrations in shallow groundwater exceed Maryland groundwater standards. GORE Sorber[™] passive soil-gas samplers were installed four feet below grade at 101 locations in a grid pattern, and spaced approximately 50 feet apart.
- Single-well permeability tests (i.e., slug tests) were conducted on 16 surficial-aquifer wells and one deep well in the Dump Road Area. Slug tests estimate aquifer hydraulic conductivity, and these results will be used to model site groundwater. The 2010 slug tests used the pressurized test method, which uses pressurized air instead of a solid cylinder (i.e., slug) to induce changes to the groundwater level in a well.
- A geophysical survey was conducted for 21 acres of primarily undeveloped land southeast of the Dump Road Area. The survey consisted of a reconnaissance-level EM survey (to detect and delineate possible boundaries of manmade fill areas and possible

buried debris) and confirmatory metal detector scanning. The geophysical survey ranged from the southern boundary of the 2007 geophysical survey at the Dump Road Area (south of the MSA compass rose) to the concrete connector between the airport runway and Taxiway Tango.

- One round of water levels was measured from the MSA monitoring wells on July 2, 2010. Continuous water levels were also recorded at wells DMW4S/I/D in conjunction with the groundwater and Frog Mortar Creek levels recorded at Conrad Ruth's Villa and Parkside Marina on the eastern shoreline of Frog Mortar Creek. Groundwater levels at wells DMW4S/I/D were measured and recorded at 15-minute intervals from June 2 to July 6, 2010.
- The supplemental data update the existing Dump Road Area groundwater model. The model update consists of examining recent water level data, groundwater potentiometric-surface maps, hydrographs, slug test results, groundwater chemical data, chemical data time-series plots, and plume maps. The model will be updated based on the new site data, and new simulations will be performed to evaluate remedial alternatives.

The following summarizes the results of 2010 supplemental activities:

- Site topography for the Dump Road Area ranges from flat to gently sloping to the northeast (toward Frog Mortar Creek). In the northern portion of the Dump Road Area, land elevations range from approximately 11 feet above NAVD88 near the runway to approximately seven feet above NAVD88 at Pond No. 2. In the southeastern portion of the site, land elevations are approximately 20 feet above NAVD88 at a mounded area near the embankment, near Frog Mortar Creek. A steeply sloped embankment runs along the Frog Mortar Creek shoreline, comprised of fill placed there as part of airport construction. The area south of the Dump Road Area is flat to gently sloping near a large lobate area north of the wetlands. A steep embankment runs along the Frog Mortar Creek shoreline and along the northern edge of the wetlands.
- Ninety-nine passive soil-gas samples were analyzed for VOCs, TPH, and diesel alkanes. TCE and cis-1,2-DCE were detected northwest of well MW33S and, to a lesser degree, northwest of well DMW11S. Maximum TCE and cis-1,2-DCE soil-gas masses of 51.51 µg and 73.12 µg, respectively, were reported at a sampling location approximately 180 feet northwest of well MW33S. TCE was also detected at sampling locations on the western side of Taxiway Tango. West and northwest of well DMW11S, TCE was detected at relatively low masses ranging from 0.03–0.10 µg; cis-1,2-DCE was not detected in this area.
- BTEX, naphthalene/2-methylnaphthalene, and TPH have soil-gas-mass distributions similar to the cVOCs. The highest levels of these analytes are west and northwest of MW33S, with lower masses on the western side of Taxiway Tango in this area. However, the distribution of TPH is more extensive than the other analytes on both sides of Taxiway Tango. BTEX, naphthalene/2-methylnaphthalene, and TPH levels northwest and west of DMW11S are also lower than the MW33S area. The highest masses of BTEX,

- naphthalene/2-methylnaphthalene and TPH are in the northern-northwestern edge of the two DMW11S sampling areas.
- The relative benzene/xylenes/TPH masses in the passive soil-gas samples indicate that the source of the contamination is either a weathered gasoline or a heavier petroleum product, such as diesel or jet fuel. Diesel-range organics are present at MW33S; therefore, despite the low relative masses of diesel-range alkanes in the passive samples, diesel/jet fuel cannot be ruled out in that area. The VOC source cannot be readily determined based on the soil gas results.
- The range of hydraulic conductivities for the lower surficial-aquifer wells is 2.74 ft/day at MW18D to 25.5 ft/day at MW15D. The geometric mean of the lower surficial-aquifer tests, excluding MW17D and MW26D (both set in clay), is 8.4 ft/day (arithmetic mean is 11.3 ft/day). A comparison of the 2003 and 2010 slug test results for wells DMW7I and DMW8D indicate that the solid slug and pneumatic slug test methods provide comparable results (i.e., same order of magnitude estimates).
- The geophysical survey identified four geophysical anomalies (i.e., areas of elevated instrument responses). They were identified as either a possible utility vault, as soil containing more clay minerals, or as saturated mineral-rich soil associated with wetlands. Metal objects were not associated with the anomalies. Metallic debris was found scattered across the ground in one small area in the northwestern corner of the survey area. It is recommended that EM anomalies A–D and the smaller EM anomalies in the northwestern corner of the survey area be excavated using test pits to verify the presence or absence of buried materials at these locations.
- Groundwater in the upper, intermediate, and lower surficial-aquifer zones flow northeast toward Frog Mortar Creek. Groundwater in the deep confined-aquifer flows northwest to southeast.

Section 6 References

- 1. *AQTESOLV*[®] 2008. *AQTESOLV*[®] for *Microsoft Windows* Professional Edition, version 4.5. Aquifer-test analysis software developed by Glenn M. Duffield, HydroSOLVE, Inc. Reston, Maryland. ©1996–2007. www.aqtesolv.com.
- 2. ASTM (ASTM International), 2004. "Guide for Selection of Aquifer Test Method in Determining Hydraulic Properties by Well Techniques." Standard D4043-96. July. www.astm.org.
- 3. ASTM (ASTM International), 2006. "Standard Practice for Field Pneumatic Slug (Instantaneous Change in Head) Tests for Determining Hydraulic Properties of Aquifers with Direct-Push Ground Water Samplers." Standard D7242-06. March. www.astm.org.
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- 7. Bouwer, H., and R. C. Rice, 1976. "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifer with Completely or Partially Penetrating Wells." *Water Resources Research*, vol. 12, No. 3. June. pp. 423–428.
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- 9. Environmental Laboratory, 1987. *Corps of Engineers Wetland Delineation Manual, Technical Report Y-87-1*. United States Army Engineer Waterways Experiment Station. Vicksburg, Mississippi.
- 10. Kruseman, G. P. and N. A. de Ridder, 1990. *Analysis and Evaluation of Pumping Test Data, Second Edition*. Institute for Land Reclamation and Improvement, The Netherlands. Publication No. 47. 377 pp.

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- 12. Tetra Tech, 2010a. *Remedial Investigation Report, Martin State Airport, 701 Wilson Point Road, Middle River, Maryland*. Prepared by Tetra Tech, Inc., Germantown, Maryland for Lockheed Martin Corporation, Bethesda, Maryland. July.
- 13. Tetra Tech, 2010b. *Draft Final Groundwater Monitoring Report, July 2010, Martin State Airport, 701 Wilson Point Road, Middle River, Maryland*. Prepared by Tetra Tech, Inc., Germantown, Maryland for Lockheed Martin Corporation, Bethesda, Maryland. September.
- 14. Tetra Tech, 2010c. *Dump Road Supplemental Design Characterization Work Plan, Martin State Airport, 701 Wilson Point Road, Middle River, Maryland.* Prepared by Tetra Tech, Inc., Germantown, Maryland for Lockheed Martin Corporation, Bethesda. Maryland. July.
- 15. Tetra Tech, 2010d. Draft Technical Memorandum: Wetland Delineation and Functional Assessment Report, Martin State Airport, 701 Wilson Point Road, Middle River, Maryland. Prepared by Tetra Tech, Inc., Germantown, Maryland for Lockheed Martin Corporation, Bethesda, Maryland. October.
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- 17. Tetra Tech, 2010f. "Appendix B—Refinement and Calibration of a Groundwater Flow Model at the Dump Road Area Site at Martin State Airport, Middle River, Maryland," in *Draft Groundwater Feasibility Study, Martin State Airport, 701 Wilson Point Road, Middle River, Maryland.* Prepared by Tetra Tech, Inc., Germantown, Maryland for Lockheed Martin Corporation, Bethesda, Maryland. November.
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APPENDIX A—PERMITS, MISS UTILITY CLEARANCE, AND UTILITY CLEARANCE REPORT



Maryland Aviation Administration

Martin O'Malley Governor

Anthony G. Brown Lt. Governor

Beverley K. Swaim-Staley Secretary

Paul J. Wiedefeld **Executive Director**

August 2, 2010

VIA FACSIMILE: 301-528-3000

Mr. Anthony Apanavage Tetra Tech, Inc. 20251 Century Boulevard, Suite 200 Germantown, MD 20874

Dear Mr. Apanavage:

Airport Zoning Permit No. 10-126 (Soil Boring Sites at Martin State Airport (MTN) SUBJECT:

Maryland Aviation Administration's (MAA) Office of Planning and Environmental Services (OPES) has received and reviewed the subject Airport Zoning Permit and determined that the proposed project lies within the MTN Airport Zoning District. To ensure the safety of the traveling public, the Code of Maryland Regulations (COMAR) authorizes MAA to review each project proposed within the Airport Zoning District, which is defined as the area within 3.3 miles of a fixed point on MTN.

The MAA has reviewed the application to ensure that the proposed project poses no hazard to the airspace surrounding MTN. The MAA analysis revealed that the temporary drilling rig operation at 6 feet above ground level (AGL)/22 feet mean sea level (MSL) would not be an obstruction to the Federal Aviation Regulations (FAR) Part 77 surfaces.

Due to the proximity of numerous drilling sites to the Runway Safety Area (RSA) of Runway 15/33 and Taxiway Tango, it is recommended that Tetra Tech perform the drilling operations in the RSA during the over-night time frame (10pm-6am) when the runway can be NOTAMed closed. It is further recommended that Tetra Tech perform the Taxiway Tango drilling operations on a Monday when the Maryland Air National Guard is normally not in operation and utilizing that taxiway.

Additionally, Tetra Tech shall notify MTN Operations at 410-682-8831 a minimum of two (2) weeks prior to any drilling operations requiring a runway closure and 72 hours prior to any drilling operations adjacent to Taxiway Tango.

The MAA hereby approves application No. 10-126 for the temporary drilling rig operation of 6 feet AGL/22 feet MSL. If you have any questions concerning this review, please contact me at 410-859-7692.

Sincerely,

J. Richard Shepley, Airport Planner Division of Airport Facilities Planning

Enclosures

cc.

Mr. Charles Baublitz, Chief, Airport Operations, MTN, Sent VIA Email

Mr. John Ludlam, Chief, MTN ATCT, Sent VIA Email

Ms. Karen D. Riddle, Permit Coordinator, Division of Documents and Permits, MAA

P.O. Box 8766, BWI Airport, Maryland 21240-0766 • 410-859-7100 • TOLL FREE: 1-800-435-9294 TTY/TDD for the hearing impaired: 410-859-7227 • www.bwiairport.com The Maryland Aviation Administration is an agency of the Maryland Department of Transportation

BP 10-023 @ LAN

MARYLAND AVIATION ADMINISTRATION APPLICATION FOR AIRPORT ZONING PERMIT

local jurisdiction. PERMIT NO.
Application No.: MARYLAND AVIATION ABMOTHER County: Anne Arundel Howard Baltimore Approval Required: Noise Zone Obstructions Date Received: 7-1-10 Date Issued: 8-2-10 Other
SECTION II: APPLICANT INFORMATION
1. Application for: (Check One) (For the purposes of this form, antenna, satellite dish, HVAC equipment, etc. should be considered "structures.")
 New Subdivision (Plat Approval) Subdivision No Structure Only ☐ Structure + Crane County Permit No. Work will be conducted using a small mobile remote control operated drill rig, not a crane. Work will not include any structures being built. Crane Only, for construction or installation that will not add height to an existing structure
2. Location: Required: ADC Map Reference Martin State Airport Property
In addition, please complete at least one of the following:
a. Tax Map Grid Parcel Lot/block (if any) b. Street Address MSA, 701 Wilson Point Road, Baltimore, MD 21220 c. N _ S _ E _ W _ side of, @ ft. from intersection with Soil borings in grass areas adjacent to Taxiway Tango and runway.
For Structures
 3. Type of improvement: New Building Addition Alteration Repair Other shallow soil borings 4. Contract price or estimated value of improvement: \$100,000 5. Proposed Use(s):
a. Residential: One family Two family Multi-family (No. units) Other b. Non-residential: Hospital, Nursing Home, Institution Office, Store, Theater, Restaurant Agriculture, Industry: type Hotel, Motel, Transient Lodging Tower, Tank: type Outdoor Spectator Sports, Park, Playground Other Environmental Investigation
 Describe proposed structures: <u>Shallow subsurface soil borings to depth of five feet.</u> Present use if different from proposed: <u>N/A</u> Size of Structure: Height <u>Soil borings will be finished back to grade with no permanent structures. Soil borings will be drilled and installed using a small mobile remote control drill rig. No permanent structures</u>
will be built out in the critical areas of the airport in any soil boring and at no time will anything be above grade. Length Width

A site plan showing the property boundaries and the location of any existing/proposed structures is required with application.

Elevations

- * MSL= Mean Sea Level. All height restrictions in the vicinity of the airport use MSL as a reference point. If you do not know the elevation of your site, you can obtain this information from the County Office of Planning and Code Enforcement Map Room.
- 9. Ground elevation of site: 9ft MSL*
- 10. Maximum elevation: (Height of structure + elevation of site): 15ft MSL*

For Cranes

- 11. Ground elevation at crane location: 9ft MSL*
- 12. Height of crane(s): 6 ft (drill rig, not crane)
- 13. Maximum elevation: (Ground elevation + height of crane): 15ft MSL*

The applicant hereby certifies and agrees as follows: (1) that he/she is authorized to make this application; (2) that the information is correct; (3) that he/she will comply with all regulations that are applicable hereto; and (4) that he/she will perform no work on the subject property not specifically described in this application.

APPLICANT (Please Print)	PROPERTY OWNER (P)	lease Print)
Tony Apanavage (Tetra Tech on be	half of Lockheed Martin)	Martin State Airport
Address: 20251 Century Blvd, Suite 200 Suite 200 Germantown, MD 20874 (City, Sta	Address:	701 Wilson Point Road Baltimore, MD. 21220 (City, State, Zip)
Phone No. <u>301-528-3021</u>		
Signature: full for	If a	:/28/10
Connection to Property: Environme	ntal consultant on behalf of I	Lockheed Martin
SECTION III: APPROVALS		
Obstruction: Approved for maxi	mum height of 22'	MSL Denied N/A
Noise: Approved Denied	N/A By: J. Mil	Sheple & Date: _8/2/10
Ammorral of this annihing is a second	4 - 4 111 4 1 - 1 - 10 1	1 .11 .

Approval of this application, if granted, will terminate if construction does not begin within one year of approval date. Approval of this permit does not preclude disturbance of applicant or occupants from aircraft operations. Please return application to: Maryland Aviation Administration, Noise Abatement Division, P.O. Box 8766, BWI Airport, MD 21240-0766. Please direct inquiries or questions to 410-859-7070.

From: Murali, Dev

Sent: Tuesday, July 27, 2010 1:50 PM

To: Apanavage, Tony

Cc: Brenner, Samantha; Markiewicz, Dawn

Subject: FW: clearance letter

Attachments: 071017soil vapor points cleared.pdf

Tony:

The letter from Enviroscan on 101 passive soil gas points clearance. You have the clearance from the MISS Utility that there are no conflicts. Pl. forward the letter and Miss Utility clearance to MAA to get the Dig permit. Set up a meeting with Tim Morgan at 9 or 9:30 Am on Monday, August 2, 2010 at Tim's office in Terminal 1.

Thanks

From: TicketCheck@managetickets.com [mailto:TicketCheck@managetickets.com]

Sent: Monday, July 26, 2010 9:33 AM

To: Brenner, Samantha

Subject: Ticket Check Status for MD Ticket 10347186

Ticket Number: 10347186

Location: WILSON POINT RD MIDDLE RIVER, MD

As of 07/26/2010 09:33:03, participating facility owners have responded to Ticket Check as follows:

District Code	Status
BGE ELECTRIC-UTILIQUEST	Clear/No conflict
BGE GAS-UTILIQUEST	Clear/No conflict
BCTY DPW - OCCLS	Clear/No conflict
COMCAST - UTILIQUEST	Clear/No conflict
VERIZON - OCCLS	Clear/No conflict

To review this ticket in its entirety, visit Search and Status® on www.managetickets.com. Please direct all questions and concerns to your one call center.

From: Tim Bechtel [mailto:tbechtel@enviroscan.com]

Sent: Tuesday, July 27, 2010 12:58 PM

To: Murali, Dev

Subject: clearance letter

Here is a letter on the 101 soil vapor points.

Timothy D. Bechtel, Ph.D., P.G.



July 27, 2010

Mary Fiori **Tetra Tech NUS, Inc.**20251 Century Boulevard
Suite 200
Germantown, MD 20874-7114

RE: Geophysical Survey

Utility Clearance Services - Four Client-Designated Areas

Enviroscan Reference Number 071017

Dear Ms. Fiori:

Pursuant to our proposal, Enviroscan, Inc. completed the first phase of work (utility clearance for 101 soil vapor points in four rectangular areas) on July 26, 2010.

Enviroscan used active and passive utility detection, including metal detection (MD), ground penetrating radar (GPR), electromagnetic (EM), and magnetic (MAG) methods to scan the four client-designated survey areas.

As a final product, Enviroscan marked the locations of identified utility anomalies directly on the ground surface using pavement paint. In addition, Enviroscan set 101 numbered vinyl pin flags at locations that the survey indicated were clear of utilities. Flags were set so that no clear location lay within 15 feet of any detected utility. The locations of all of the flags were recorded using a Topcon GPS with differential corrections from WAAS, providing a nominal sub-meter accuracy. The recorded coordinates will be delivered electronically within 48 hours, but the flagged clear locations should provide sufficient information for intrusive activities to begin.





ENVIROSCAN, INC.

Ms. Fiori July 27, 2010 Page 2

The above-referenced geophysical survey was completed using standard and/or routinely accepted practices of the geophysical industry and equipment representing the best available technology. Enviroscan does not accept responsibility for survey limitations due to inherent technological limitations or unforeseen site-specific conditions. However, we make every effort to identify and notify the client of such limitations or conditions. In particular, please note the following specific limitations and recommendations: Enviroscan's field markings should be considered accurate to within approximately +/-18 inches for single lines. In contrast, since electromagnetic tracing of duct banks provides only a centerline, the bank itself may extend for 2 to 3 feet beyond the marked trace. Also, note that the completion of this survey does not relieve any party of applicable legal obligations to notify the appropriate One-Call service prior to digging or drilling.

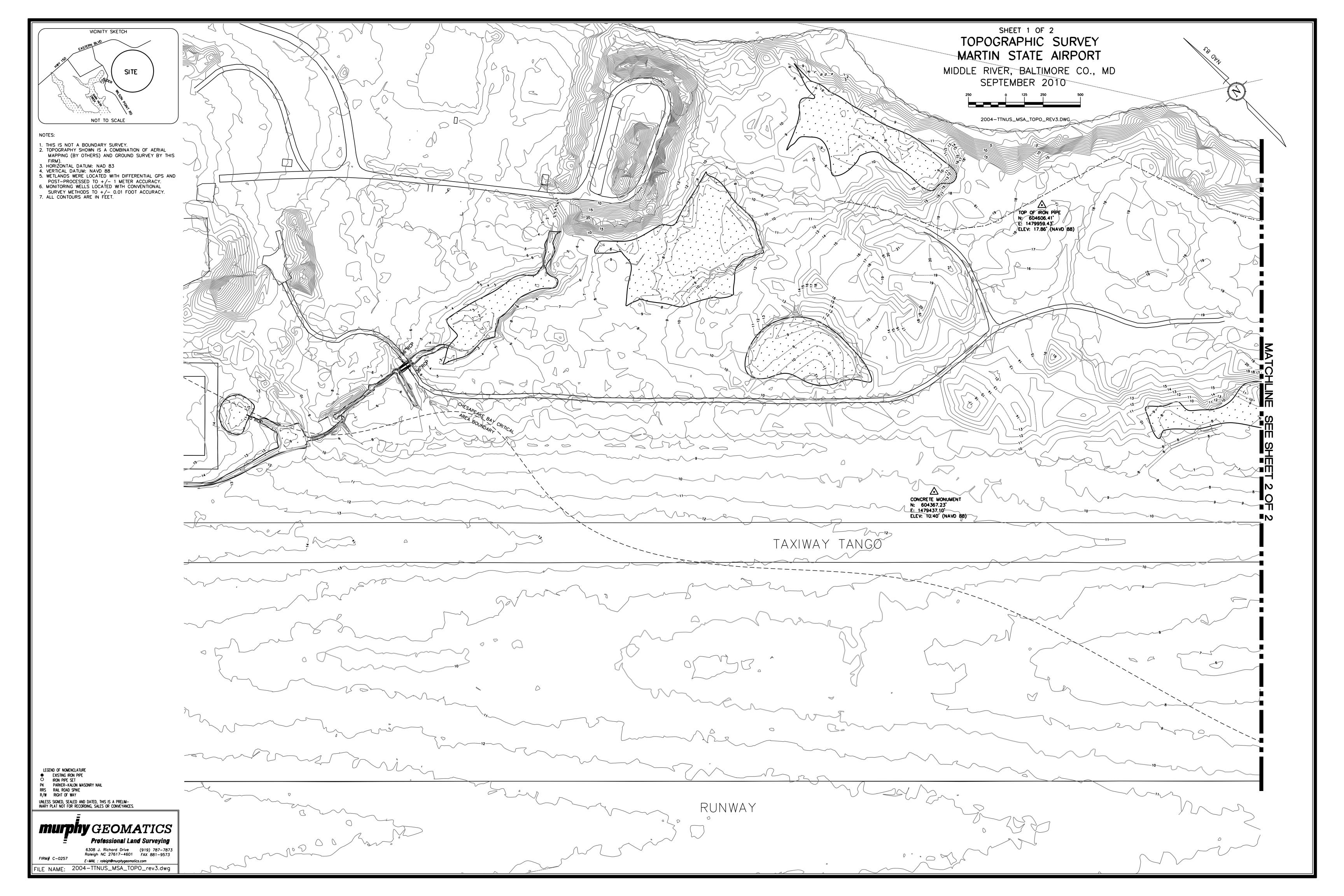
As always, we appreciate this opportunity to work with you again. If you have any questions, please do not hesitate to contact me.

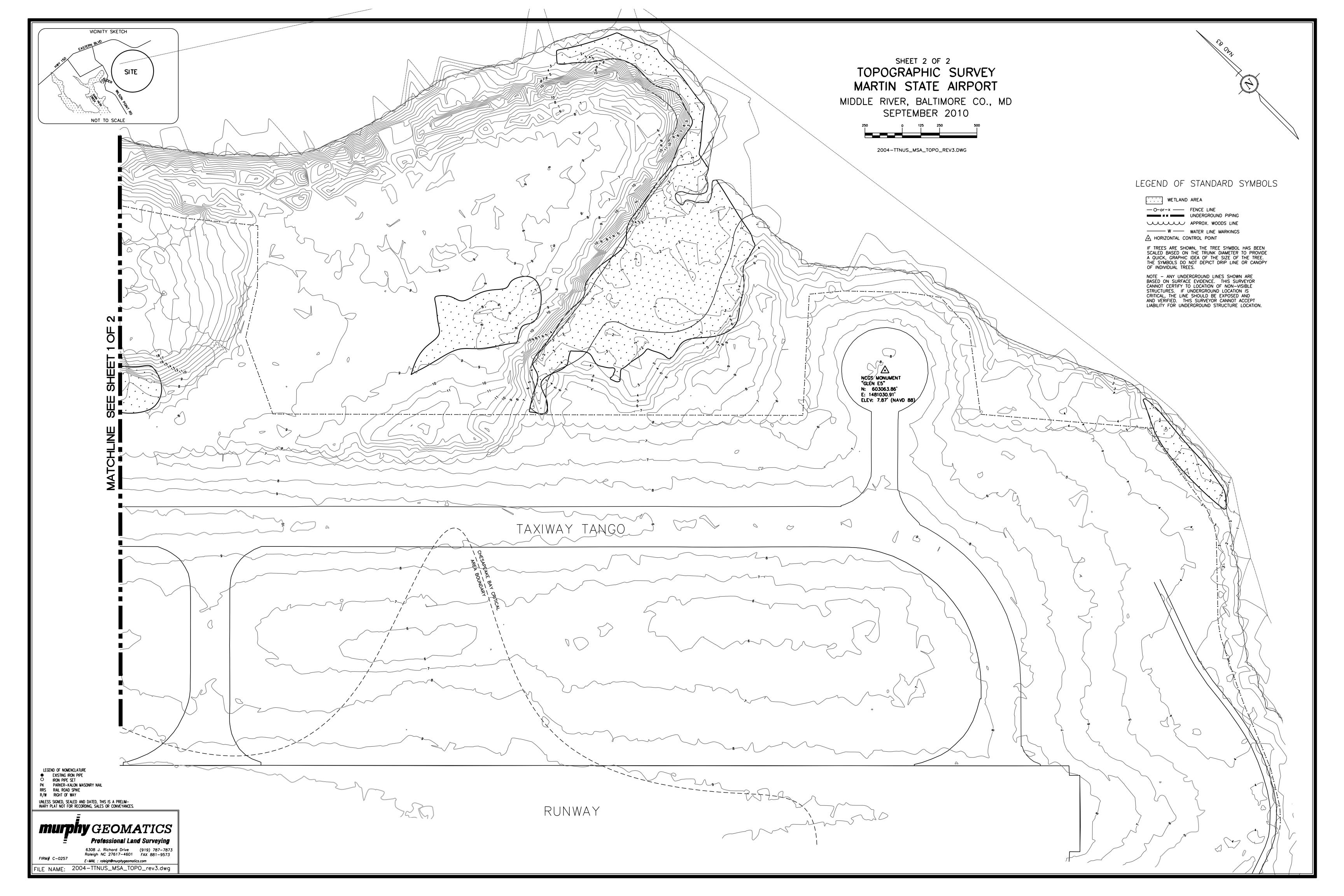
Sincerely,

Enviroscan, Inc.

Timothy D. Bechtel, Ph.D., P.G. Principal Geophysicist

APPENDIX B—TOPOGRAPHICAL SURVEY MAPS





APPENDIX C—PASSIVE SOIL-GAS SAMPLING-DATA TABLE AND REPORT



GORE[™] Surveys

Final Report

Project:

Martin State Airport

Gore Order Number: Date Prepared: 20657596

Prepared for:

September 24, 2010

Tetra Tech NUS

20251 Century Blvd. Suite 200

Germantown, MD 20874

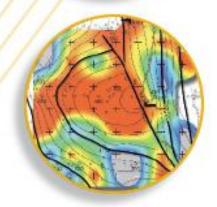
Written/Submitted by Hilary G. Trethewey Project Manager Hilany D. Trethewey

Reviewed/Approved by Hilary G. Trethewey Product Specialist Jog W. Hoshy

Analytical Data Reviewed by Dayna M. Cobb Chemist Dayna Mabb







W.L. Gore & Associates, Inc. Survey Products Group

REPORT DATE: 09/24/2010 **AUTHOR:** HGT

SITE INFORMATION

Site Reference: Martin State Airport

Gore Production Order Number: 20657596 Gore Site Code: FOB

FIELD PROCEDURES

Modules shipped: 115

Installation Date(s): 8/2,4/2010

Modules Installed: 101

Field work performed by: Tetra Tech NUS

Retrieval date(s): 8/16,18/2010 Exposure Time: 14 [days] # Modules Retrieved: 99 # Trip Blanks Returned: 5 # Unused Modules Returned: 9

Modules Not Returned: 0

Date/Time Received by Gore: 8/20/2010 1:00 PM By: DY

Chain of Custody Form attached: Yes **Chain of Custody discrepancies:** None

Comments:

Modules 640669 to 640673 were identified as trip blanks.

Modules 640583 and 640619 were noted as "shredded outside hole" on the installation

and retrieval log and are considered lost in the field. Modules 640674 to 640682 were returned unused.

The installation and retrieval log was scanned and returned to Gore via e-mail.

GORE[®] Surveys - Final Report

ANALYTICAL PROCEDURES

W.L. Gore & Associates' Survey Products' Laboratory operates under the guidelines of ISO Standard 17025, its Quality Assurance Manual, Operating Procedures and Methods. For this project, the analytical method, reported results, and observations reported are considered screening level and do not fall within the scope of W.L. Gore's ISO 17025 accreditation.

Analytical Method Quality Assurance:

Instrumentation consists of state of the art gas chromatographs equipped with mass selective detectors, coupled with automated thermal desorption units. Sample preparation simply involves cutting the tip off the bottom of the sample module and transferring one or more exposed sorbent containers (sorbers, each containing engineered adsorbents) to a thermal desorption tube for analysis. Sorbers remain clean and protected from dirt, soil, and ground water by the insertion/retrieval cord, and require no further sample preparation.

The analytical method employed is a modified EPA method 8260/8270. Before each run sequence, two instrument blanks, a sorber containing 5µg BFB (Bromofluorobenzene), and a method blank are analyzed. The BFB mass spectra must meet the criteria set forth in the method before samples can be analyzed. A method blank and a sorber containing BFB are also analyzed after every 30 samples and/or trip blanks. Standards containing the selected target compounds at five calibration levels are analyzed at the beginning of each run. The criterion for each target compound is less than 25% RSD (relative standard deviation). If this criterion is not met for any target compound, the analyst has the option of generating second- or third-order standard curves, as appropriate. A second-source reference standard, at a level of 10µg per target compound, is analyzed after every ten samples and/or trip blanks, and at the end of the run sequence. Positive identification of target compounds is determined by 1) the presence of the target ion and at least two secondary ions; 2) retention time versus reference standard; and, 3) the analyst's judgment.

NOTE: All data have been archived. Any replicate sorbers not used in the initial analysis will be discarded fifteen (15) days from the date of analysis.

Laboratory analysis: thermal desorption, gas chromatography, mass selective detection

Instrument ID: # 11 Chemist: FN/JE Compounds/mixtures requested: A1 Deviations from Standard Method: None

Comments: Soil vapor analytes and abbreviations are tabulated in the Data Table Key (page 6).

DATA TABULATION

CONTOUR MAPS ENCLOSED: Five (5) B-sized color contour maps LIST OF MAPS ENCLOSED:

- Benzene, Toluene, Ethyl benzene, and total Xylenes (BTEX)
- Total Petroleum Hydrocarbons (TPH)
- Trichloroethene (TCE)
- cis-1,2-dichloroethene (c12DCE)
- Naphthalene & 2-Methylnaphthalene (Naph. & 2-Methylnaph.)

NOTE: All data values presented in Appendix A represent masses of compound(s) desorbed from the GORETM Modules received and analyzed by W.L. Gore & Associates, Inc., as identified in the Chain of Custody (Appendix A). The measurement traceability and instrument performance are reproducible and accurate for the measurement process documented. Semi-quantitation of the compound mass is based on a five-level standard calibration.

General Comments:

- This survey reports soil gas mass levels present in the vapor phase. Vapors are subject to a variety of attenuation factors during migration away from the source concentration to the module. Thus, mass levels reported from the module will often be less than concentrations reported in soil and groundwater matrix data. In most instances, the soil gas masses reported on the modules compare favorably with concentrations reported in the soil or groundwater (e.g., where soil gas levels are reported at greater levels relative to other sampled locations on the site, matrix data should reveal the same pattern, and vice versa). However, due to a variety of factors, a perfect comparison between matrix data and soil gas levels can rarely be achieved.
- Soil gas signals reported by this method cannot be identified specifically to soil adsorbed, groundwater, and/or free-product contamination. The soil gas signal reported from each module can evolve from all of these sources. Differentiation between soil and groundwater contamination can only be achieved with prior knowledge of the site history (i.e., the site is known to have groundwater contamination only).
- Total petroleum hydrocarbon (TPH) values were calculated using the area under the peaks observed in m/z 55 and 57 selected ion chromatograms. Quantitation of the mass value was performed using the response factor a specific alkane (present in the calibration standards).
- TPH values include the entire chromatogram and provide estimates for aliphatic hydrocarbon ranges of C4 to C20.
- QA/QC trip blank modules were provided to document potential exposures that were not part of the soil gas signal of interest (i.e., impact during module shipment, installation and retrieval, and storage). The trip blanks are identically manufactured and packaged soil gas modules to those modules placed in the subsurface. However, the trip blanks remain unopened during all phases of the soil gas survey. Levels

reported on the trip blanks may indicate potential impact to modules other than the contaminant source of interest.

- Unresolved peak envelopes (UPEs) are represented as a series of compound peaks clustered together around a central gas chromatograph elution time in the total ion chromatogram. Typically, UPEs are indicative of complex fluid mixtures that are present in the subsurface. UPEs observed early in the chromatogram are considered to indicate the presence of more volatile fluids, while UPEs observed later in the chromatogram may indicate the presence of less volatile fluids. Multiple UPEs may indicate the presence of multiple complex fluids.
- Stacked total ion chromatograms (TICs) are included in Appendix A. The six-digit serial number of each module is incorporated into the TIC identification (e.g.: 123456S.D represents module #123456).

Project Specific Comments:

- The minimum (gray) contour level, for each mapped analyte or group of analytes, was set at the maximum blank level observed or the method detection limit, whichever was greater. When target compounds are combined (i.e., BTEX), the contour minimum is arbitrarily set at 0.02 µg or the maximum blank level, whichever is greater. The maximum contour level was set at the maximum value observed.
- Low levels of TPH compounds were detected on the trip blanks and/or the method blanks. Thus, target analyte levels reported for the field-installed modules that exceed trip and method blank levels, and the analyte method detection limit, are more likely to have originated from on-site sources.
- The mapped spatial patterns indicated the presence of target compounds in the survey area. Highest levels of mapped compounds were found in the north eastern portion of the survey.

KEY TO DATA TABLE

UNITS

μg micrograms, relative mass value

MDL method detection limit

below detection limit; compound was observed at level

below the MDL

nd non-detect, compound was not detected at any level

ANALYTES

TPH total petroleum hydrocarbons

BTEX combined masses of benzene, toluene, ethylbenzene and total xylenes

(Gasoline Range Aromatics)

BENZ benzene
TOL toluene
EtBENZ ethylbenzene
mpXYL m-, p-xylene
oXYL o-xylene

C11,C13&C15 combined masses of undecane, tridecane, and pentadecane (C11+C13+C15)

(Diesel Range Alkanes)

UNDEC undecane
TRIDEC tridecane
PENTADEC pentadecane

TMBs combined masses of 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene

135TMB1,3,5-trimethylbenzene124TMB1,2,4-trimethylbenzeneMTBEmethyl t-butyl etherNAPHnaphthalene2MeNAPH2-methyl naphthalene

2MeNAPH 2-methyl naphthalen MTBE methyl t-butyl ether

OCT octane

ct12DCE cis- & trans-1,2-dichloroethene t12DCE trans-1,2-dichloroethene c12DCE cis-1,2-dichloroethene 11DCA 1,1-dichloroethane

CHC13 chloroform

111TCA 1,1,1-trichloroethane 1.2-dichloroethane 12DCA carbon tetrachloride CC14 TCE trichloroethene tetrachloroethene PCE chlorobenzene **CIBENZ** 14DCB 1,4-dichlorobenzene 11DCE 1,1-dichloroethene 112TCA 1,1,2-trichloroethane 1112TetCA 1,1,1,2-tetrachloroethane 1.1.2.2-tetrachloroethane 1122TetCA 1,3-dichlorobenzene 13DCB 12DCB 1,2-dichlorobenzene

BLANKS

method blank QA/QC module, documents analytical conditions during analysis

APPENDIX A:

- 1. CHAIN OF CUSTODY AND INSTALLATION AND RETRIEVAL LOG 2. DATA TABLE
 - 3. STACKED TOTAL ION CHROMATOGRAMS
 - 4. COLOR CONTOUR MAPS

GORE-SORBER® Screening Survey Chain of Custody

For W.L. Gore & Associates use only Production Order # 20657596

GORE	
Creative Technologies	

W. L. Gore & Associates, Inc., Survey Products Group

100 Chesapeake Boulevard • Elkton, Maryland 21921 • Tel: (410) 392-7600 • Fax (410) 506-4780

Instructions: Customer n	nust complete <u>ALL</u> sh	aded cells							
Customer Name: TETRA TECH		Site Name: SOIL GAS SITE							
Address: 20251 CENTU	RY BLVD	Site Address: & Please send results to							
SUITE 200		Deu Mural	Deu Musali						
GERMANTOW	/N, MD 20874	Project Manager: SAMANTHA BRENNE							
Phone: (301) 528-5552		Customer Project No.: 12003599							
FAX:			ote #: TETRA TECH						
			IL GAS 10072						
Serial # of Modules Shipped		# of Modules for Installation 110 #	of Trip Blanks 5						
# 640562 - # 640622	# - #	Total Modules Shipped: 115	Pieces						
# 640629 - # 640682	- #	Total Modules Received: 115	Pieces						
# - #	# - #	Total Modules Installed: 101	Pieces						
# - #	# - #	Serial # of Trip Blanks (Client Decides)	#						
# - #	# - #	# 640669 #	#						
# - #	# - #	# 640670 #	#						
# - #	# - #	# 640 671 #	#						
+ - #	# - #	# 640672 #	#						
# - #	# - #	# 640 673 #	#						
# - #	# - #	# #	#45 4						
Prepared By: Warlene b	zelletwely	# #	#						
Verified By: Chunk	WHI	# #	#						
Installation Performed By:		Installation Method(s) (circle those that ap	oply):						
Name (please print): Stuart	, Dawn, Mike	Slide Hammer Hammer Drill	Auger						
Company/Affiliation: 7etr	a Tech	Other:							
Installation Start Date and Time:	8/3	1 10 16:16	(AM)PM						
Installation Complete Date and Ti	me: & / L	1 / 10 12:00	AM PM						
Retrieval Performed By:		Total Modules Retrieved: 101	Pieces						
Name (please print): mike,	Walt, Dawn	Total Modules Lost in Field:	Pieces						
Company/Affiliation:1_TeH		Total Unused Modules Returned:9_	Pieces						
Retrieval Start Date and Time:	8 / /	6/10 9:53	AM) PM						
Retrieval Complete Date and Tim			AM) PM						
Relinquished By Curley	// // // //	_	_ Date Time						
Affiliation: W.L. Gore & Associa									
Relinquished By Mely (_ Date Time						
Affiliation: Tetra Tecl			-						
Relinquished By	Date Time	71	7						
Affiliation		Affiliation: W.L. Gore & Associates, Inc.	18/20/10 1:00						

GO	RE-SORB	ER® Screening	Survey	SITE NA	ME &	LOCATI	ON		***************************************	
Inst	tallation an	d Retrieval Log	s ar vey	Mach				1 _		
		a received and and	•	TIKKE		TIE H	ubou	<u>.1</u>		
Page_	<u>1.</u> of <u>3</u> .									***************************************
					NCE OF					
LINE	MODULE #	INSTALLATION	RETRIEVAL	HYDRO	CARBON or	NS (LPH)		OULE IN ATER		
#		DATE/TIME	DATE/TIME	HYDRO	CARBO	N ODOR		ck one)		OMMENTS
					as appro					OWNIENTS
1.	640562	20100101	ely han one		ODOR	NONE	YES	NO		
2.	640563	8101 6011618	8/16/10/09/53				1	E	45	3-Ft.
3.	640564	#12100 1023	8/16/10@0956	 			/	十二	44,	<u>' 4-F}.</u>
4.	640565	8/3/10/0 1005	8/16/10 @ 1000				<u> </u>	$\perp X$	43.	4-F+
5.	640566		8/16/10/2 1000					X	46	<u> 4,0'</u>
6.	640567		8/16/106/1003					+	4-1.	1.0,
7.	640568		8/16/10/05				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	+3	48.	4.0'
8.	640569		816106 1007				✓	1	51.	40'
9.	640570		8/16/10/00/1008					X	50.	4.0'
10.	640571	81211001048						X	Hã.	4.0'
11.	640572		8/16/10@1014					+->-	- 53 -	401 40,
12.	640573	8/2/100/053	8/16/100 1015				1	X	53	
13.	640574	8/201 901/6/8	8/16/100 1000					V	54,	4.0'
14.	640575		8/16/100 1019					X	55	4.0' 4.0'
15.	640576 ,		8/16/10@ 10K				V	6	53.	4.0'
16.	640577	819100109	8/16/10@1034					×	58	4.0
17.	640578	819/100/1024	8/16/10/0 10/03		· ·			X	59	4.0'
18.	640579	819/100 1105	3/16/100/1024				V	1	60	4.0'
19.	640580	81911001103.	846/10@1026					X	63	4.0
20. 21.	640581	8/2/10/2/10/2	8/16/100/1007				V	8	63	4.0'
22.	640582	1 1	5/14/10@1039					X	61.	40'
23.	640583 640584	219/00/11	Shredded out	side hoi	e - 15	125		X	64	4.01
24.	640585	8/2/100/1908	SIKO1001048					X	65.	4.0
25.	640586	8/3/106/13/8	11611001050					X	ldo.	4.0'
26.	640587		8/16/100 1051					_X	68.	4.0
27.	640588	8/3/10/0 1136	116/1001058				√	<u>**</u>	67	40'
28.	640589		5/16/10/2 1101				_		69.	4.0'
29.	640590	8/2/100 1130 8	116/10/03				√	_	70.	4.0'
30.	640591							X	71,	4.01
31.	640592		16/10/01/05					X	74',	4.01
32.	640593		stidioe 1106				-		13,	40!
33.	640594	8/3/100/142 8	16/10/01/08				4	玉	<u> 7a</u> :	4.00
34.	640595	8/2/10@1146 8		York I.			/ 	**		4.0,
35.	640596		116/106 1111	ork los	or mon	v dronuc	1	X.	76,	4.0
36.	640597		16100 1113	iork loos	e nor	y alton	0	_X_]],	40'
37.	640598	8 P13 90 1159 8				-		<u>X</u>	<u>80' </u>	40'
38.	640599		16/100116	·			<u> </u>	<u>=</u>	<u> 19</u>	40'
39.	640600	812110012038					V	<u>*</u>	J8'	4.0'
40.	640601	8/2/10/6/18/8	116001118				V	코	63	7.0'
41.	640602		16/1001/21				V	₹	81	4.0,
42.	640603	, ,	116/10/01/23						<u>85.</u>	4.0
				L				^	84.	4.0

GORE-SORBER® Screening Survey SITE NAME & LOCATION Martin State Airport **Installation and Retrieval Log** Page 2. of 3 . **EVIDENCE OF LIQUID** HYDROCARBONS (LPH) MODULE IN LINE MODULE# RETRIEVAL INSTALLATION WATER HYDROCARBON ODOR DATE/TIME DATE/TIME (check one) COMMENTS (Check as appropriate) LPH ODOR NONE YES NO 640604 8/2/10@1215/8/16/10@1125 43. 4.01 87 640605 8/2/10 @1344 8/16/10 @ 1128 44. 4.0 83 45. 640606 8/2/10 e1346 8/16/10@1131 4.0 86 46. 640607 8/2/10@13498/16/10@1133 4.01 89 47. 640608 8/2/10@1355&/16/10@1135 4.0 88 48. 640609 8/2/10 01358 8/16/10@1138 4.0 92. 49. 640610 6/2/10@14008/16/10@1330 9 4.01 50. 640611 8/2/10 01403 8/16/10@1520 (found outside Hole 90 4.0' 51. 640612 8/2/10 e 1407 8/16/10@1343 93 4.01 52. 640613 12/10@1408&116/10@1352 4.0' 94 2/10 @14098/16/10€ 1358 53. 640614 95 4.0' 54. 640615 6/2/10@14168/16/10@1414 98 4.0 55. 640616 6/2/10@1417 8/16/10@1421 4.0' 97 56. 640617 8/2/10@1417/8/16/10@1435 96. 4.0' 57. 640618 8/2/10/14/19/8/16/10/1442 99 4.0' 8/2/10/014208/16/10@1452 (shredded outside Hole) 640619 58. 100. 4.0' 59. 640620 2/10@14218/16/10@1616 4.0' 101 60. 640621 61410@2239 6118110@0937 22. 4.0' 61. 640622 8/4/1002241 8/16/10@0942 4.0 25 62. 8/4/10@22438/18/10@0947 640629 28 4.0 63. 640630 6/4/10 @2245 B/18/10@0950 3 4.0' 64. 640631 8/4/10022468/18/100099 34 4.0' 65. 640632 8/4'/10@ 2249 8/18/10E0958 X 37 4.0' 66. 640633 6/4/10@2251 8/18/10@1002 40 4.0' 67. 640634 814/10@2253 8/18/10@1003 4,0 68. 640635 8/4/10 @2254 8/18/10@0959 38 4.0' 69. 640636 6/4/10@2255 8/18/10@0956 35 4.0 8/4/10@2256 8/18/10@0952 70. 640637 32 4.0 71. 640638 844110@2258 8/18/1000948 29 4.0 72. 640639 8H110@2300 8/18/1080944 26 4.0 110@ 2301 8/18/10@0938 (found outside Hole) 73. 640640 33 4.0 74. 640641 1/10@2303 8/18/10@0941 1/10@23058/18/10@0945 4.0' 75. 640642 4.0' 76. 640643 1110@23078/18/1000949 30 4.0 77. 640644 8/4/100 2308 8/18/1000953 33 4.0' 6|41|0023310|8|18|1000957 6|4|10023312|8|18|1001000 78. 640645 36 4.0 79. 640646 4.0 80. 640647 110@2314 8/18/10@1004 4.0 81. 640648 8/4/10/2318/8/18/10/20930 4.0' 82. 640649 8/4/10@23208/18/10@0928 18 4.0 64/10/02321/8/18/10/0927 83. 640650 4.0 8/4/10@2323/8/18/10/20925 84. 640651 4.0

GORE-SORBER® Screening Survey SITE NAME & LOCATION State Airport Martin **Installation and Retrieval Log** Page_3_ of 3_ **EVIDENCE OF LIQUID** HYDROCARBONS (LPH) MODULE IN LINE **MODULE#** INSTALLATION RETRIEVAL WATER DATE/TIME DATE/TIME HYDROCARBON ODOR (check one) **COMMENTS** (Check as appropriate) ODOR NONE YES NO 8/4/10@2325 8/18/10@0924 8/4/10@2326 8/18/10@0922 8/4/10@2328 8/18/10@0921 640652 85. $\overline{\mathsf{X}}$ 4.0' 86. 640653 40' 87. 640654 4.0' 88. 640655 814/10@2330/8/18/10@0919 4.0' 84/10@23328/18/10@0918 640656 89. 4.0' 1/10@2334/8/18/10@0916 90. 640657 4.0' 8/4/10/22337/8/18/10/20915 91. 640658 11 4.0' 8/4/10@2337\8/18/10@0913\8/4/10@2337\8/18/10@0913\8/4/10@2337\8/18/10@0913\8/4/10@2347\8/18/10@0910\8/4/10@2349\8/18/10@0909\8/4/10@2353\8/18/10@0904\8/4/10@2353\8/18/10@0904\ 92. 640659 14 4.0 93. 640660 4.0' 94. 640661 4.0 95. 640662 4.0' 96. 640663 4.0 97. 640664 4.01 10 8/4/10@23548/18/10@0906 98. 640665 4.0' 99. 640666 4.0' 8/4/10@2359 8/18/10@0901 100. 640667 4.0' 640668 8/4/10@0000 8/18/10@0900 101. 4.0' 102. 640669 103. 640670 104. 640671 105. 640672 106. 640673 107. 640674 108. 640675 109. 640676 110. 640677 640678 111. 112. 640679 113. 640680 114. 640681 115. 640682 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126.

DATE	SAMPLE	1								
ANALYZED	NAME	TPH, ug	BTEX, ug	BENZ, ug	TOL, ug	EtBENZ, ug	mpXYL, ug	oXYL, ug	C11, C13, &C15, ug	UNDEC, ug
	MDL=	0.02		0.02	0.02	0.02	0.03	0.02		0.04
8/26/2010	640562	48.68	0.45	0.19	0.19	nd	0.03	0.03	0.06	bdl
8/24/2010	640563	39.64	0.96	0.13	0.19	0.05	0.22	0.36	0.37	0.25
8/25/2010	640564	16.46	0.09	0.07	0.02	nd	bdl	nd	0.03	bdl
8/24/2010	640565	70.03	0.16	0.16	bdl	nd	nd	nd	0.24	0.14
8/25/2010	640566	64.47	0.63	0.22	0.02	nd	0.24	0.15	0.26	0.15
8/24/2010	640567	256.41	1.29	0.34	0.22	0.11	0.23	0.40	0.28	0.21
8/25/2010	640568	52.48	0.23	0.18	0.03	bdl	bdl	0.02	0.18	0.08
8/24/2010	640569	30.34	0.09	0.06	0.03	nd	nd	bdl	0.07	0.07
8/25/2010	640570	14.28	0.17	0.17	nd	nd	nd	nd	0.28	0.09
8/26/2010	640571	0.07	0.11	0.11	nd	nd	nd	nd	nd	nd
8/25/2010	640572	0.17	0.08	0.08	nd	nd	nd	nd	0.02	nd
8/25/2010	640573	137.02	3.95	0.30	0.06	1.04	1.96	0.59	0.30	0.26
8/26/2010	640574	0.18	0.09	0.09	nd	nd	nd	nd	nd	nd
8/25/2010	640575	20.83	0.14	0.11	0.04	nd	nd	nd	bdl	bdl
8/25/2010	640576	23.58	0.07	0.07	bdl	nd	bdl	nd	nd	nd
8/25/2010	640577	6.12	0.09	0.09	nd	nd	nd	nd	bdl	bdl
8/25/2010	640578	2.19	0.17	0.17	nd	nd	nd	nd	nd	nd
8/25/2010	640579	173.35	31.86	0.25	0.52	0.62	29.68	0.79	0.07	0.07
8/25/2010	640580	5.64	0.16	0.08	0.05	0.03	nd	nd	bdl	bdl
8/25/2010	640581	0.11	0.04	0.04	nd	nd	nd	nd	nd	nd
8/26/2010	640582	0.12	0.09	0.09	nd	nd	nd	nd	nd	nd
8/26/2010	640584	1.33	0.04	0.04	nd	nd	nd	nd	nd	nd
8/24/2010	640585	0.61	0.02	0.02	nd	nd	nd	nd	0.19	0.19
8/26/2010	640586	0.15	nd	nd	nd	nd	nd	nd	nd	nd
8/26/2010	640587	212.97	151.99	0.14	0.17	4.23	146.95	0.50	bdl	bdl
8/25/2010	640588	67.30	0.63	0.24	0.06	bdl	0.13	0.19	0.09	0.07
8/26/2010	640589	340.83	2.18	1.07	0.40	0.23	0.28	0.20	0.14	0.14
8/26/2010	640590	0.40	0.11	0.05		nd	bdl	nd	nd	nd
8/25/2010	640591	2.60	0.20	0.03	0.10	nd	0.05	0.02	bdl	bdl
8/26/2010	640592	209.26	1.21	0.66	0.13	0.05	0.19	0.18	nd	nd
8/26/2010	640593	86.27	0.88	0.55	0.10	0.04	0.09	0.10	0.61	0.54

9/24/2010 Page: 1 of 16 No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

DATE	SAMPLE									
ANALYZED	NAME	TPH, ug	BTEX, ug	BENZ, ug	TOL, ug	EtBENZ, ug	mpXYL, ug	oXYL, ug	C11, C13, &C15, ug	UNDEC, ug
	MDL=	0.02		0.02	0.02	0.02	0.03	0.02		0.04
8/25/2010	640594	274.98	3.51	0.75	0.65	0.17	0.67	1.27	0.46	0.38
8/26/2010	640595	536.14	13.71	3.45	1.25	2.90	4.40	1.72	8.64	2.96
8/25/2010	640596	89.32	1.32	0.43	0.48	0.04	0.22	0.16	1.67	0.92
8/26/2010	640597	18.27	0.26	0.05	0.06	bdl	0.09	0.06	0.29	0.26
8/27/2010	640598	95.60	1.54	0.18	0.74	0.13	0.40	0.09	bdl	bdl
8/25/2010	640599	26.89	2.95	0.25	0.02	1.90	0.70	0.09	nd	nd
8/25/2010	640600	145.51	0.88	0.21	0.05	0.13	0.31	0.19	1.95	1.33
8/26/2010	640601	226.73	4.38	1.91	0.27	0.84	1.16	0.19	0.04	0.04
8/25/2010	640602	0.61	0.03	0.03	nd	nd	nd	nd	0.35	0.35
8/24/2010	640603	1.11	0.05	0.05	nd	nd	nd	nd	0.11	0.11
8/25/2010	640604	1.72	0.10		bdl	nd	nd	nd	1.09	1.09
8/26/2010	640605	14.05	0.43	0.22	0.04	0.02	0.10	0.05	bdl	bdl
8/26/2010	640606	2.32	0.18		0.03	nd	0.05	0.02	bdl	bdl
8/25/2010	640607	1.56	0.10	0.08	0.02	nd	bdl	bdl	0.35	0.35
8/26/2010	640608	1.08	0.12	0.09	0.03	nd	nd	nd	0.70	0.70
8/26/2010	640609	1.29	0.22	0.11	0.03	nd	0.05	0.03	bdl	bdl
8/25/2010	640610	1.39	0.10			nd	bdl	nd	nd	nd
8/24/2010	640611	1.19	0.10	0.08	0.02	nd	nd	nd	0.25	0.25
8/26/2010	640612	0.23	0.05	0.05	nd	nd	nd	nd	nd	nd
8/27/2010	640613	0.17	0.12	0.12	nd	nd	nd	nd	bdl	bdl
8/24/2010	640614	0.18	0.08	0.08	nd	nd	nd	nd	nd	nd
8/26/2010	640615	0.22	0.08	0.08		nd	nd	nd	nd	nd
8/27/2010	640616	0.24	0.04	0.04	nd	nd	nd	nd	0.06	0.06
8/26/2010	640617	0.14	0.22	0.22	nd	nd	nd	nd	nd	nd
8/26/2010	640618	0.06	0.10	0.10	nd	nd	nd	nd	bdl	bdl
8/25/2010	640620	0.79	0.04	0.04	nd	nd	nd	nd	0.44	0.44
8/26/2010	640621	0.05	0.03	0.03		nd	nd	nd	nd	nd
08/25/10	640622	0.59	0.12	0.07	0.05	nd	nd	nd	0.07	0.07
8/27/2010	640629	0.04	0.04	0.04	nd	nd	nd	nd	nd	nd
8/26/2010	640630	0.16	0.04	0.04	nd	nd	nd	nd	0.09	0.09
8/27/2010	640631	0.10	0.03	0.03	nd	nd	nd	nd	0.06	0.06

9/24/2010 Page: 2 of 16 No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

DATE	SAMPLE									
ANALYZED	NAME	TPH, ug	BTEX, ug	BENZ, ug	TOL, ug	EtBENZ, ug	mpXYL, ug	oXYL, ug	C11, C13, &C15, ug	UNDEC, ug
	MDL=	0.02		0.02	0.02	0.02	0.03	0.02		0.04
8/25/2010	640632	0.70	0.02	0.02	nd	nd	nd	nd	nd	nd
8/26/2010	640633	8.60	0.08	0.08	nd	nd	nd	nd	bdl	bdl
8/25/2010	640634	11.46	0.08	0.08	nd	nd	bdl	nd	0.13	0.05
8/24/2010	640635	4.13	0.04	0.04	nd	nd	nd	nd	0.05	nd
8/26/2010	640636	4.91	0.04	0.04	nd	nd	nd	nd	0.07	bdl
8/26/2010	640637	2.41	0.09	0.09	nd	nd	nd	nd	0.69	0.69
8/27/2010	640638	0.02	0.02	0.02	nd	nd	nd	nd	nd	nd
8/25/2010	640639	0.04	0.04	0.04	nd	nd	nd	nd	nd	nd
8/24/2010	640640	0.23	0.03	0.03	nd	nd	nd	nd	bdl	bdl
8/27/2010	640641	0.46	0.02	0.02	nd	nd	nd	nd	bdl	bdl
8/27/2010	640642	0.10	0.04	0.04	nd	nd	nd	nd	0.05	0.05
8/26/2010	640643	0.14	0.10	0.10	nd	nd	nd	nd	nd	nd
8/26/2010	640644	2.35	0.06	0.06	nd	nd	nd	nd	bdl	bdl
8/27/2010	640645	0.35	0.22	0.22	nd	nd	nd	nd	nd	nd
8/26/2010	640646	1.41	0.05	0.05	nd	nd	nd	nd	nd	nd
8/25/2010	640647	132.14	0.91	0.52	0.22	0.05	0.08	0.05	0.85	0.59
8/26/2010	640648	59.19	0.03	0.03		nd	nd	nd	3.13	
8/24/2010	640649	24.15	0.38	0.33	0.05	nd	nd	nd	0.11	0.08
8/27/2010	640650	9.65	0.09	0.09	nd	nd	nd	nd	0.39	0.36
8/26/2010	640651	2.53	0.03	0.03	nd	nd	nd	nd	1.88	1.88
8/24/2010	640652	0.12	0.02	0.02	nd	nd	nd	nd	nd	nd
8/27/2010	640653	0.03	0.02	0.02	nd	nd	nd	nd	nd	nd
8/26/2010	640654	0.50	0.03	0.03	nd	nd	nd	nd	nd	nd
8/25/2010	640655	0.48	0.04	0.04	nd	nd	nd	nd	0.30	0.30
8/26/2010	640656	0.14	0.08	0.03	nd	nd	0.05	nd	0.07	0.07
8/25/2010	640657	1.65	0.04	0.04	nd	nd	nd	nd	1.32	1.32
8/26/2010	640658	0.15	0.03	0.03	nd	nd	nd	nd	nd	nd
8/26/2010	640659	1.67	0.08	0.08	nd	nd	nd	nd	1.33	1.33
8/25/2010	640660	5.40	0.07	0.07	nd	nd	nd	nd	nd	
8/26/2010	640661	0.77	0.20	0.20	nd	nd	nd	nd	0.05	0.05
8/25/2010	640662	2.09	0.15	0.12	0.03	nd	nd	nd	bdl	bdl

9/24/2010 Page: 3 of 16 No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

DATE	SAMPLE									
ANALYZED	NAME	TPH, ug	BTEX, ug	BENZ, ug	TOL, ug	EtBENZ, ug	mpXYL, ug	oXYL, ug	C11, C13, &C15, ug	UNDEC, ug
	MDL=	0.02		0.02	0.02	0.02	0.03	0.02		0.04
8/25/2010	640663	0.17	0.05	0.05	nd	nd	nd	nd	nd	nd
8/25/2010	640664	0.10	0.08	0.08	nd	nd	nd	nd	nd	nd
8/25/2010	640665	0.23	0.04	0.04	nd	nd	nd	nd	nd	nd
8/25/2010	640666	0.06	0.06	0.06	nd	nd	nd	nd	nd	nd
8/25/2010	640667	0.09	0.11	0.11	nd	nd	nd	nd	nd	nd
8/25/2010	640668	0.08	0.19	0.19	nd	nd	nd	nd	nd	nd
8/26/2010	640669	0.19	nd	nd	nd	nd	nd	nd	nd	nd
8/27/2010	640670	0.02	nd	nd	nd	nd	nd	nd	nd	nd
8/26/2010	640671	0.02	nd	nd	nd	nd	nd	nd	nd	nd
8/24/2010	640672	0.14	nd	nd	nd	nd	nd	nd	nd	nd
8/25/2010	640673	0.03	nd	nd	nd	nd	nd	nd	nd	nd
8/24/2010	method blank	0.24	nd	nd	nd	nd	nd	nd	nd	nd
8/25/2010	method blank	0.03	nd	nd	nd	nd	nd	nd	nd	nd
8/26/2010	method blank	bdl	nd	nd	nd	nd	nd	nd	nd	nd
8/26/2010	method blank	0.02	nd	nd	nd	nd	nd	nd	nd	nd
	Maximum	536.14	151.99	3.45	1.25	4.23	146.95	1.72	8.64	3.13
	Standard Dev.	84.20	15.59	0.41	0.18	0.56	15.03	0.24	0.98	0.53
	Mean	36.42	2.35	0.18	0.07	0.13	1.90	0.08	0.31	0.22

9/24/2010 Page: 4 of 16 No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

SAMPLE									
NAME	TRIDEC, ug	PENTADEC, ug	TMBs, ug	124TMB, ug	135TMB, ug	ct12DCE, ug	t12DCE, ug	c12DCE, ug	NAPH&2-MN, ug
MDL=	0.02	0.02		0.02	0.03		0.04	0.03	
640562	0.06	nd	0.03	0.03	nd	0.07	nd	0.07	0.03
640563	0.12	nd	0.40	0.15	0.25	3.20	0.18	3.01	0.75
640564	0.03	bdl	bdl	bdl	nd	bdl	nd	bdl	bdl
640565	0.07	0.03	nd	nd	nd	nd	nd	nd	0.02
640566	0.11	nd	0.23	0.15	0.08	nd	nd	nd	0.08
640567	0.07	nd	1.44	0.43	1.01	0.04	nd	0.04	0.18
640568	0.10	nd	0.03	0.03	bdl	bdl	nd	bdl	0.03
640569	nd	nd	bdl	bdl	bdl	nd	nd	nd	bdl
640570	0.13	0.06	bdl	nd	bdl	bdl	nd	bdl	bdl
640571	nd	nd	nd	nd	nd	nd	nd	nd	nd
640572	0.02	nd	nd	nd	nd	nd	nd	nd	nd
640573	0.05	nd	3.16	0.65	2.51	0.35	bdl	0.35	0.12
640574	nd	nd	nd	nd	nd	nd	nd	nd	nd
640575	nd	nd	nd	nd	nd	0.61	0.23	0.38	bdl
640576	nd	nd	bdl	bdl	nd	0.45	0.07	0.38	bdl
640577	nd	nd	0.02	0.02	bdl	nd	nd	nd	0.14
640578	nd	nd	nd	nd	nd	0.63	0.12	0.51	nd
640579	nd	nd	2.50	1.95	0.55	2.36	0.17	2.19	0.03
640580	nd	nd	bdl	bdl	nd	nd	nd	nd	nd
640581	nd	nd	nd	nd	nd	nd	nd	nd	nd
640582	nd	nd	nd	nd	nd	nd	nd	nd	nd
640584	nd	nd	nd	nd	nd	0.21	0.05	0.17	nd
640585	nd	nd	nd	nd	nd	nd	nd	nd	nd
640586	nd	nd	nd	nd	nd	nd	nd	nd	nd
640587	bdl	nd	17.00	7.44	9.56	0.17	bdl	0.17	0.05
640588	0.02	nd	0.26	0.10	0.17	1.53	0.18	1.35	2.40
640589	nd	nd	0.43	0.18	0.25	7.44	0.55	6.89	0.04
640590	nd	nd	nd	nd	nd	nd	nd	nd	0.09
640591	bdl	nd	bdl	nd	bdl	0.43	0.07	0.36	0.87
640592	nd	nd	0.06	nd	0.06	0.82	0.10	0.73	bdl
640593	0.08	nd	0.07	0.03	0.05	1.06	0.14	0.92	bdl

9/24/2010 Page: 5 of 16 No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

SAMPLE									
NAME	TRIDEC, ug	PENTADEC, ug	TMBs, ug	124TMB, ug	135TMB, ug	ct12DCE, ug	t12DCE, ug	c12DCE, ug	NAPH&2-MN, ug
MDL=	0.02	0.02		0.02	0.03		0.04	0.03	
640594	0.07	nd	2.93	0.55	2.38	87.31	14.19	73.12	0.12
640595	3.60	2.08	8.31	7.16	1.15	0.14	nd	0.14	1.95
640596	0.63	0.12	0.38	0.20	0.18	nd	nd	nd	0.32
640597	0.03	nd	bdl	bdl	bdl	nd	nd	nd	bdl
640598	nd	nd	0.10	0.06	0.05	nd	nd	nd	nd
640599	nd	nd	2.59	1.04	1.55	0.03	nd	0.03	nd
640600	0.57	0.05	1.28	0.39	0.89	bdl	nd	bdl	0.36
640601	nd	nd	bdl	nd	bdl	0.46	0.07	0.38	bdl
640602	nd	nd	nd	nd	nd	nd	nd	nd	nd
640603	nd	nd	nd	nd	nd	nd	nd	nd	bdl
640604	nd	bdl	nd	nd	nd	nd	nd	nd	0.08
640605	nd	nd	0.05	bdl	0.05	0.35	0.07	0.28	nd
640606	bdl	nd	nd	nd	nd	0.27	bdl	0.27	nd
640607	nd	nd	bdl	bdl	bdl	0.08	nd	0.08	0.09
640608	nd	nd	nd	nd	nd	nd	nd	nd	nd
640609	nd	nd	bdl	bdl	bdl	0.12	nd	0.12	0.07
640610	nd	nd	nd	nd	nd	bdl	nd	bdl	nd
640611	bdl	bdl	nd	nd	nd	nd	nd	nd	bdl
640612	nd	nd	nd	nd	nd	nd	nd	nd	nd
640613	nd	nd	nd	nd	nd	nd	nd	nd	nd
640614	nd	nd	nd	nd	nd	nd	nd	nd	nd
640615	nd	nd	nd	nd	nd	nd	nd	nd	nd
640616	nd	nd	nd	nd	nd	nd	nd	nd	nd
640617	nd	nd	nd	nd	nd	nd	nd	nd	nd
640618	nd	nd	nd	nd	nd	nd	nd	nd	nd
640620	bdl	nd	nd	nd	nd	nd	nd	nd	nd
640621	nd	nd	nd	nd	nd	nd	nd	nd	nd
640622	nd	nd	nd	nd	nd	nd	nd	nd	nd
640629	nd	nd	nd	nd	nd	nd	nd	nd	nd
640630	nd	nd	nd	nd	nd	nd	nd	nd	nd
640631	nd	nd	nd	nd	nd	nd	nd	nd	nd

9/24/2010 Page: 6 of 16 No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

SAMPLE									
NAME	TRIDEC, ug	PENTADEC, ug	TMBs, ug	124TMB, ug	135TMB, ug	ct12DCE, ug	t12DCE, ug	c12DCE, ug	NAPH&2-MN, ug
MDL=	0.02	0.02		0.02	0.03		0.04	0.03	
640632	nd	nd	nd	nd	nd	nd	nd	nd	nd
640633	bdl	nd	nd	nd	nd	nd	nd	nd	nd
640634	0.05	0.04	nd	nd	nd	nd	nd	nd	0.81
640635	0.03	0.03	nd	nd	nd	nd	nd	nd	0.76
640636	0.04	0.03	nd	nd	nd	nd	nd	nd	0.31
640637	bdl	nd	nd	nd	nd	nd	nd	nd	bdl
640638	nd	nd	nd	nd	nd	nd	nd	nd	nd
640639	nd	nd	nd	nd	nd	nd	nd	nd	nd
640640	nd	nd	nd	nd	nd	nd	nd	nd	nd
640641	nd	nd	nd	nd	nd	nd	nd	nd	bdl
640642	nd	nd	nd	nd	nd	nd	nd	nd	nd
640643	nd	nd	nd	nd	nd	nd	nd	nd	nd
640644	nd	nd	nd	nd	nd	nd	nd	nd	nd
640645	nd	nd	nd	nd	nd	nd	nd	nd	bdl
640646	nd	nd	nd	nd	nd	nd	nd	nd	nd
640647	0.26	nd	0.11	0.06	0.05	nd	nd	nd	0.09
640648	nd	nd	nd	nd	nd	nd	nd	nd	0.24
640649	0.04	nd	0.04	0.04	bdl	nd	nd	nd	0.07
640650	0.03	bdl	bdl	bdl	nd	nd	nd	nd	0.12
640651	bdl	nd	nd	nd	nd	nd	nd	nd	nd
640652	nd	nd	nd	nd	nd	nd	nd	nd	nd
640653	nd	nd	nd	nd	nd	nd	nd	nd	nd
640654	nd	nd	nd	nd	nd	bdl	nd	bdl	nd
640655	nd	nd	nd	nd	nd	nd	nd	nd	0.17
640656	nd	nd	nd	nd	nd	nd	nd	nd	nd
640657	bdl	nd	nd	nd	nd	nd	nd	nd	nd
640658	nd	nd	nd	nd	nd	nd	nd	nd	nd
640659	nd	nd	nd	nd	nd	nd	nd	nd	nd
640660	nd	nd	nd	nd	nd	nd	nd	nd	nd
640661	nd	nd	nd	nd	nd	nd	nd	nd	nd
640662	nd	nd	nd	nd	nd	nd	nd	nd	nd

No mdl is available for summed combinations of analytes. In summed 9/24/2010 columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

SAMPLE									
NAME	TRIDEC, ug	PENTADEC, ug	TMBs, ug	124TMB, ug	135TMB, ug	ct12DCE, ug	t12DCE, ug	c12DCE, ug	NAPH&2-MN, ug
MDL=	0.02	0.02		0.02	0.03		0.04	0.03	
640663	nd	nd	nd	nd	nd	nd	nd	nd	nd
640664	nd	nd	nd	nd	nd	nd	nd	nd	nd
640665	nd	nd	nd	nd	nd	nd	nd	nd	nd
640666	nd	nd	nd	nd	nd	nd	nd	nd	nd
640667	nd	nd	nd	nd	nd	nd	nd	nd	nd
640668	nd	nd	nd	nd	nd	nd	nd	nd	nd
640669	nd	nd	nd	nd	nd	nd	nd	nd	nd
640670	nd	nd	nd	nd	nd	nd	nd	nd	nd
640671	nd	nd	nd	nd	nd	nd	nd	nd	nd
640672	nd	nd	nd	nd	_	nd	nd	nd	nd
640673	nd	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd		nd	nd	nd	nd
method blank	nd	nd	nd	nd		nd	nd	nd	nd
method blank	nd	nd	nd	nd	_	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd
Marrian	2.00	0.00	47.00	7 44	0.50	07.04	4440	70.40	0.40
Maximum	3.60		17.00	7.44			14.19	73.12	2.40
Standard Dev.	0.37	0.21	1.96	1.05		8.80	1.43	7.37	0.34
Mean	0.06	0.03	0.42	0.21	0.21	1.09	0.16	0.93	0.10

9/24/2010 Page: 8 of 16 No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

SAMPLE											
NAME	NAPH, ug	2MeNAPH, ug	MTBE, ug	11DCE, ug	11DCA, ug	111TCA, ug	12DCA, ug	TCE, ug	OCT, ug	PCE, ug	14DCB, ug
MDL=	0.02	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02
640562	0.03	bdl	nd	nd	nd	nd	nd	0.19	nd	nd	nd
640563	0.20	0.55	nd	nd	nd	nd	nd	2.07	0.05	nd	nd
640564	nd	bdl	nd	nd	nd	nd	nd	0.08	nd	nd	nd
640565	0.02	bdl	nd	nd	nd	nd	nd	bdl	0.04	nd	nd
640566	0.03	0.05	nd	nd	nd	nd	nd	0.32	0.14	nd	nd
640567	0.07	0.11	nd	nd	nd	nd	nd	0.04	1.40	nd	nd
640568	0.03	bdl	nd	nd	nd	nd	nd	0.02	bdl	nd	nd
640569	nd	bdl	nd	nd	nd	nd	nd	nd	nd	nd	nd
640570	nd	bdl	nd	nd	nd	nd	nd	0.08	nd	nd	nd
640571	nd	nd	nd	nd	nd	nd	nd	bdl	nd	nd	nd
640572	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640573	0.07	0.04	nd	nd	nd	nd	nd	0.06	0.09	nd	bdl
640574	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640575	nd	bdl	nd	nd	nd	nd	nd	0.26	nd	nd	nd
640576	nd	bdl	nd	nd	nd	nd	nd	0.05	nd	nd	nd
640577	0.05	0.09	nd	nd	nd	nd	nd	nd	nd	nd	nd
640578	nd	nd	nd	nd	nd	nd	nd	0.05	nd	nd	nd
640579	0.03	nd	nd	nd	nd	nd	nd	8.58	7.92	0.13	nd
640580	nd	nd	nd	nd	nd	nd	nd	nd	0.02	nd	nd
640581	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640582	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640584	nd	nd	nd	nd	nd	nd	nd	0.76	nd	nd	nd
640585	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640586	nd	nd	nd	nd	nd	nd	nd	nd		nd	nd
640587	0.03	0.02	nd	nd	nd	nd	nd	0.21	2.93	0.03	nd
640588	1.85	0.55	nd	nd	nd	nd	nd	1.53	0.29	bdl	nd
640589	0.04	bdl	nd	nd	nd	nd	nd	9.91	8.95	nd	nd
640590	0.07	0.02	nd	nd	nd	nd	nd	0.53	nd	nd	nd
640591	0.45	0.42	nd	nd	nd	nd	nd	1.00	nd	nd	nd
640592	bdl	bdl	nd	nd	nd	nd	bdl	0.12	2.45	nd	nd
640593	nd	bdl	nd	nd	nd	nd	nd	0.82	0.10	nd	nd

No mdl is available for summed combinations of analytes. In summed 9/24/2010 columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

SAMPLE											
NAME	NAPH, ug	2MeNAPH, ug	MTBE, ug	11DCE, ug	11DCA, ug	111TCA, ug	12DCA, ug	TCE, ug	OCT, ug	PCE, ug	14DCB, ug
MDL=	0.02	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02
640594	0.07	0.06	nd	nd	nd	nd	nd	51.51	2.83	0.29	nd
640595	1.07	0.88	nd	nd	nd	nd	nd	0.03	5.82	nd	nd
640596	0.25	0.07	nd	nd	nd	nd	nd	0.07	0.09	nd	nd
640597	nd	bdl	nd	nd	nd	nd	nd	bdl	nd	nd	nd
640598	nd	nd	nd	nd	nd	nd	nd	bdl	1.54	nd	nd
640599	nd	nd	nd	nd	nd	nd	nd	0.04	0.06	nd	nd
640600	0.15	0.22	nd	nd	nd	nd	nd	0.04	0.68	nd	nd
640601	nd	bdl	nd	nd	nd	nd	nd	0.02	16.55		nd
640602	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640603	nd	bdl	nd	nd	nd	nd	nd	nd	nd	nd	nd
640604	0.05	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd
640605	nd	nd	nd	nd	nd	nd	nd	0.27	0.06	nd	nd
640606	nd	nd	nd	nd	nd	nd	nd	1.47	nd	nd	nd
640607	0.04	0.04	nd	nd	nd	nd	nd	0.04	bdl	nd	nd
640608	nd	nd	nd	nd	nd	nd	nd	bdl	nd	nd	nd
640609	0.04	0.03	nd	nd	nd	nd	nd	0.05	nd	nd	nd
640610	nd	nd	nd	nd	nd	nd	nd	0.28	nd	nd	nd
640611	nd	bdl	nd	nd	nd	nd	nd	nd	nd	nd	nd
640612	nd	nd	nd	nd	nd	nd	nd	0.03	nd	nd	nd
640613	nd	nd	nd	nd	nd	nd	nd	0.03	nd	nd	nd
640614	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640615	nd	nd	nd	nd	nd	nd	nd	bdl	nd	nd	nd
640616	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640617	nd	nd	nd	nd	nd	nd	nd	0.03	nd	nd	nd
640618	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640620	nd	nd	nd	nd	nd	nd	nd	0.10		nd	nd
640621	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640622	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640629	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640630	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640631	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

No mdl is available for summed combinations of analytes. In summed 9/24/2010 columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

SAMPLE											
NAME	NAPH, ug	2MeNAPH, ug	MTBE, ug	11DCE, ug	11DCA, ug	111TCA, ug	12DCA, ug	TCE, ug	OCT, ug	PCE, ug	14DCB, ug
MDL=	0.02	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02
640632	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640633	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640634	0.42	0.39	nd	nd	nd	nd	nd	nd	nd	0.06	nd
640635	0.21	0.54	nd	nd	nd	nd	nd	0.10	nd	0.18	nd
640636	0.11	0.20	nd	nd	nd	nd	nd	0.04	nd	0.11	nd
640637	nd	bdl	nd	nd	nd	nd	nd	nd	nd	nd	nd
640638	nd	nd	nd	nd	nd	nd	nd	nd			nd
640639	nd	nd	nd	nd	nd	nd	nd	nd			nd
640640	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640641	nd	bdl	nd	nd	nd	nd	nd	nd	nd	nd	nd
640642	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640643	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640644	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640645	nd	bdl	nd	nd	nd	nd	nd	0.03	nd	0.03	nd
640646	nd	nd	nd	nd	nd	nd	nd	bdl	nd	_	nd
640647	0.03	0.06	nd	nd	nd	nd	nd	bdl	3.19	nd	nd
640648	0.18	0.06	nd	nd	nd	nd	nd	nd			nd
640649	0.05	0.02	nd	nd	nd	nd	nd	nd	0.03	nd	nd
640650	0.09	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd
640651	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640652	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640653	nd	nd	nd	nd	nd	nd	nd	nd	nd	_	nd
640654	nd	nd	nd	nd	nd	nd	nd	0.07	nd	0.07	nd
640655	0.15	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
640656	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640657	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640658	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640659	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640660	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640661	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640662	nd	nd	nd	nd	nd	nd	nd	nd	bdl	nd	nd

No mdl is available for summed combinations of analytes. In summed 9/24/2010 columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

SAMPLE											
NAME	NAPH, ug	2MeNAPH, ug	MTBE, ug	11DCE, ug	11DCA, ug	111TCA, ug	12DCA, ug	TCE, ug	OCT, ug	PCE, ug	14DCB, ug
MDL=	0.02	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02
640663	nd	nd	nd	nd	nd	nd	nd	nd	bdl	nd	nd
640664	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640665	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640666	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640667	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640668	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640669	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640670	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640671	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640672	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
640673	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Maximum	1.85	0.88	0.00	0.00	0.00	0.00	0.02	51.51	16.55		0.02
Standard Dev.	0.22	0.14	0.00	0.00	0.00	0.00	0.00	5.32	2.16		0.00
Mean	0.06	0.05	0.00	0.00	0.00	0.00	0.00	0.82	0.56	0.01	0.00

9/24/2010 Page: 12 of 16

SAMPLE								
NAME	CHCl3, ug	CCl4, ug	112TCA, ug	CIBENZ, ug	1112TetCA, ug	1122TetCA, ug	13DCB, ug	12DCB, ug
MDL=	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02
640562	nd	nd	nd	nd	nd	nd	nd	nd
640563	nd	nd	nd	nd	nd	nd	nd	nd
640564	nd	nd	nd	nd	nd	nd	nd	nd
640565	nd	nd	nd	nd	nd	nd	nd	nd
640566	nd	nd	nd	nd	nd	nd	nd	nd
640567	nd	nd	nd	nd	nd	nd	nd	nd
640568	nd	nd	nd	nd	nd	nd	nd	nd
640569	nd	nd	nd	nd	nd	nd	nd	nd
640570	nd	nd	nd	nd	nd	nd	nd	nd
640571	nd	nd	nd	nd	nd	nd	nd	nd
640572	nd	nd	nd	nd	nd	nd	nd	nd
640573	nd	nd	nd	nd	nd	nd	nd	nd
640574	nd	nd	nd	nd	nd	nd	nd	nd
640575	nd	nd	nd	nd	nd	nd	nd	nd
640576	nd	nd	nd	nd	nd	nd	nd	nd
640577	nd	nd	nd	nd	nd	nd	nd	nd
640578	nd	nd	nd	nd	nd	nd	nd	nd
640579	nd	nd	nd	0.15	nd	nd	nd	nd
640580	nd	nd	nd	nd	nd	nd	nd	nd
640581	nd	nd	nd	nd	nd	nd	nd	nd
640582	nd	nd	nd	nd	nd	nd	nd	nd
640584	nd	nd	nd	nd	nd	nd	nd	nd
640585	nd	nd	nd	nd	nd	nd	nd	nd
640586	nd	nd	nd	nd	nd	nd	nd	nd
640587	nd	nd	nd	nd	nd	nd	nd	nd
640588	nd	nd	nd	nd	nd	nd	nd	nd
640589	nd	nd	nd	nd	nd	nd	nd	nd
640590	nd	nd	nd	nd	nd	nd	nd	nd
640591	nd	nd	nd	nd	nd	nd	nd	nd
640592	nd	nd	nd	nd	nd	nd	nd	nd
640593	nd	nd	nd	nd	nd	nd	nd	nd

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SAMPLE								
NAME	CHCl3, ug	CCl4, ug	112TCA, ug	CIBENZ, ug	1112TetCA, ug	1122TetCA, ug	13DCB, ug	12DCB, ug
MDL=	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02
640594	nd	nd	nd	nd	nd	nd	nd	nd
640595	nd	nd	nd	nd	nd	nd	nd	nd
640596	nd	nd	nd	nd	nd	nd	nd	nd
640597	nd	nd	nd	nd	nd	nd	nd	nd
640598	nd	nd	nd	nd	nd	nd	nd	nd
640599	nd	nd	nd	nd	nd	nd	nd	nd
640600	nd	nd	nd	nd	nd	nd	nd	nd
640601	nd	nd	nd	nd	nd	nd	nd	nd
640602	nd	nd	nd	nd	nd	nd	nd	nd
640603	nd	nd	nd	nd	nd	nd	nd	nd
640604	nd	nd	nd	nd	nd	nd	nd	nd
640605	nd	nd	nd	nd	nd	nd	nd	nd
640606	nd	nd	bdl	nd	nd	nd	nd	nd
640607	nd	nd	nd	nd	nd	nd	nd	nd
640608	nd	nd	nd	nd	nd	nd	nd	nd
640609	nd	nd	nd	nd	nd	nd	nd	nd
640610	nd	nd	nd	nd	nd	nd	nd	nd
640611	nd	nd	nd	nd	nd	nd	nd	nd
640612	nd	nd	nd	nd	nd	nd	nd	nd
640613	nd	nd	nd	nd	nd	nd	nd	nd
640614	nd	nd	nd	nd	nd	nd	nd	nd
640615	nd	nd	nd	nd	nd	nd	nd	nd
640616	nd	nd	nd	nd	nd	nd	nd	nd
640617	nd	nd	nd	nd	nd	nd	nd	nd
640618	nd	nd	nd	nd	nd	nd	nd	nd
640620	nd	nd	nd	nd	nd	nd	nd	nd
640621	nd	nd	nd	nd	nd	nd	nd	nd
640622	nd	nd	nd	nd	nd	nd	nd	nd
640629	nd	nd	nd	nd	nd	nd	nd	nd
640630	nd	nd	nd	nd	nd	nd	nd	nd
640631	nd	nd	nd	nd	nd	nd	nd	nd

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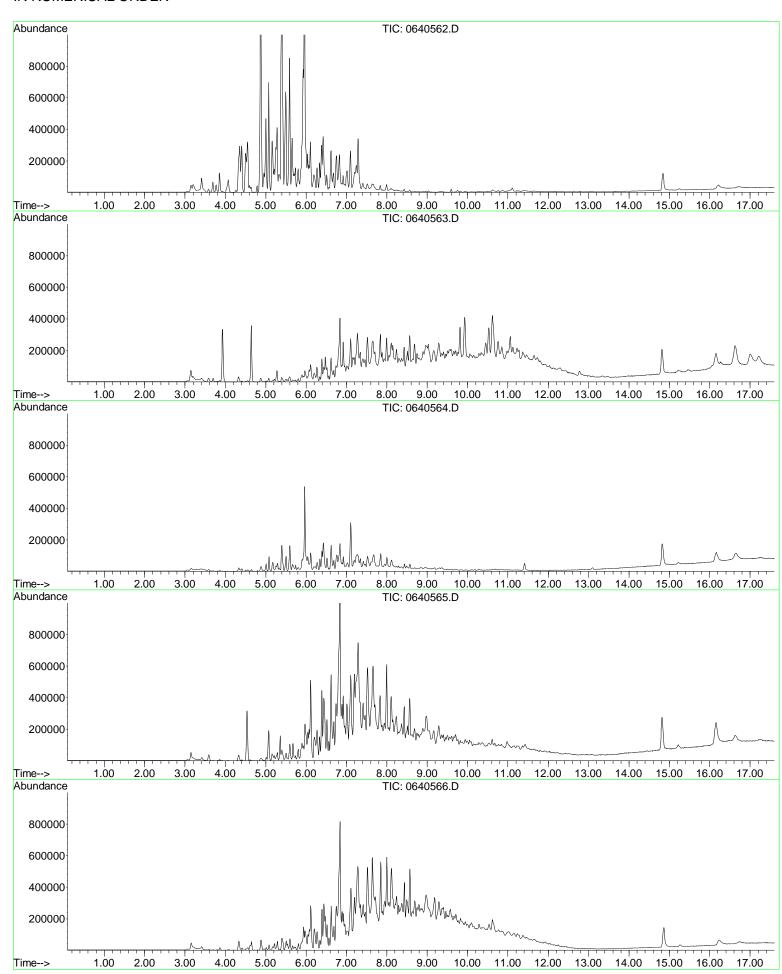
SAMPLE								
NAME	CHCl3, ug	CCl4, ug	112TCA, ug	CIBENZ, ug	1112TetCA, ug	1122TetCA, ug	13DCB, ug	12DCB, ug
MDL=	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02
640632	nd	nd	nd	nd	nd	nd	nd	nd
640633	nd	nd	nd	nd	nd	nd	nd	nd
640634	nd	nd	nd	nd	nd	nd	nd	nd
640635	0.02	nd	nd	nd	nd	nd	nd	nd
640636	nd	nd	nd	nd	nd	nd	nd	nd
640637	nd	nd	nd	nd	nd	nd	nd	nd
640638	nd	nd	nd	nd	nd	nd	nd	nd
640639	nd	nd	nd	nd	nd	nd	nd	nd
640640	nd	nd	nd	nd	nd	nd	nd	nd
640641	nd	nd	nd	nd	nd	nd	nd	nd
640642	nd	nd	nd	nd	nd	nd	nd	nd
640643	nd	nd	nd	nd	nd	nd	nd	nd
640644	nd	nd	nd	nd	nd	nd	nd	nd
640645	nd	nd	nd	nd	nd	nd	nd	nd
640646	nd	nd	nd	nd	nd	nd	nd	nd
640647	nd	nd	nd	nd	nd	nd	nd	nd
640648	nd	nd	nd	nd	nd	nd	nd	nd
640649	nd	nd	nd	nd	nd	nd	nd	nd
640650	nd	nd	nd	nd	nd	nd	nd	nd
640651	nd	nd	nd	nd	nd	nd	nd	nd
640652	nd	nd	nd	nd	nd	nd	nd	nd
640653	nd	nd	nd	nd	nd	nd	nd	nd
640654	nd	nd	nd	nd	nd	nd	nd	nd
640655	nd	nd	nd	nd	nd	nd	nd	nd
640656	nd	nd	nd	nd	nd	nd	nd	nd
640657	nd	nd	nd	nd	nd	nd	nd	nd
640658	nd	nd	nd	nd	nd	nd	nd	nd
640659	nd	nd	nd	nd	nd	nd	nd	nd
640660	nd	nd	nd	nd	nd	nd	nd	nd
640661	nd	nd	nd	nd	nd	nd	nd	nd
640662	nd	nd	nd	nd	nd	nd	nd	nd

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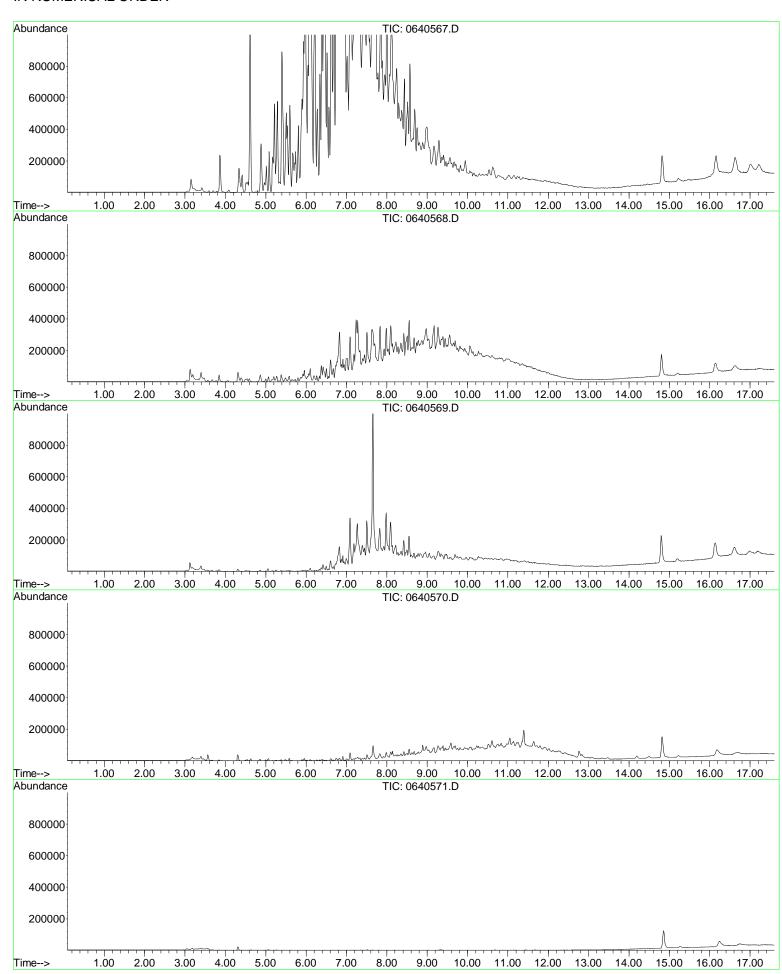
SAMPLE								
NAME	CHCl3, ug	CCl4, ug	112TCA, ug	CIBENZ, ug	1112TetCA, ug	1122TetCA, ug	13DCB, ug	12DCB, ug
MDL=	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02
640663	nd	nd	nd	nd	nd	nd	nd	nd
640664	nd	nd	nd	nd	nd	nd	nd	nd
640665	nd	nd	nd	nd	nd	nd	nd	nd
640666	nd	nd	nd	nd	nd	nd	nd	nd
640667	nd	nd	nd	nd	nd	nd	nd	nd
640668	nd	nd	nd	nd	nd	nd	nd	nd
640669	nd	nd	nd	nd	nd	nd	nd	nd
640670	nd	nd	nd	nd	nd	nd	nd	nd
640671	nd	nd	nd	nd	nd	nd	nd	nd
640672	nd	nd	nd	nd	nd	nd	nd	nd
640673	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd
Maximum	0.02	0.00	0.01	0.15	0.00	0.00	0.00	0.00
Standard Dev.	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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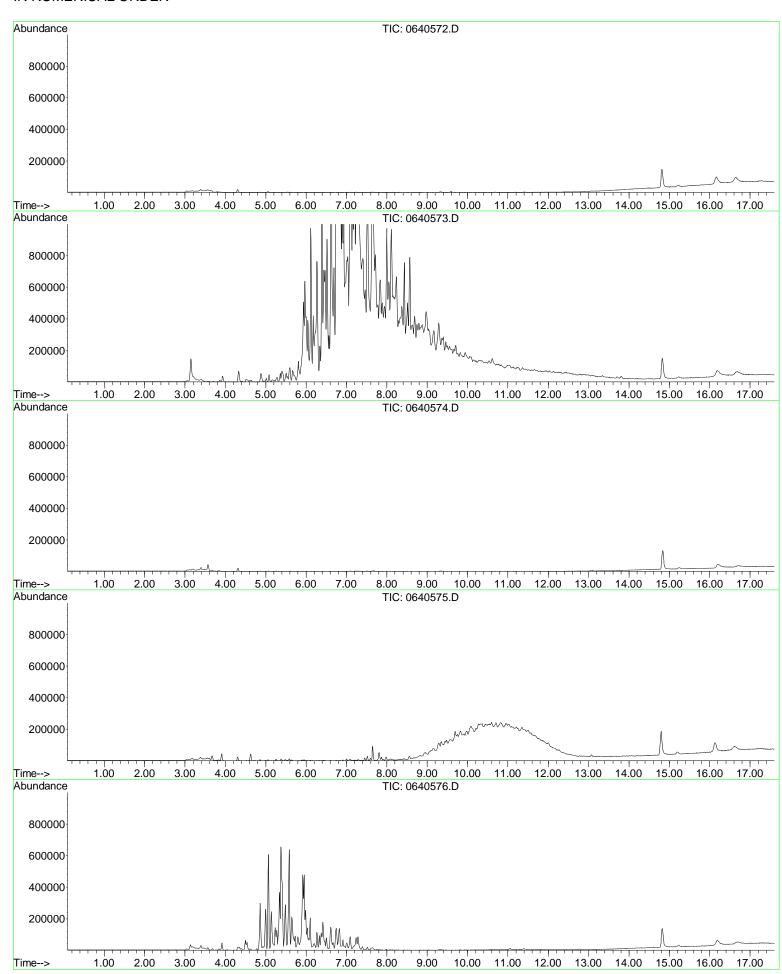
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



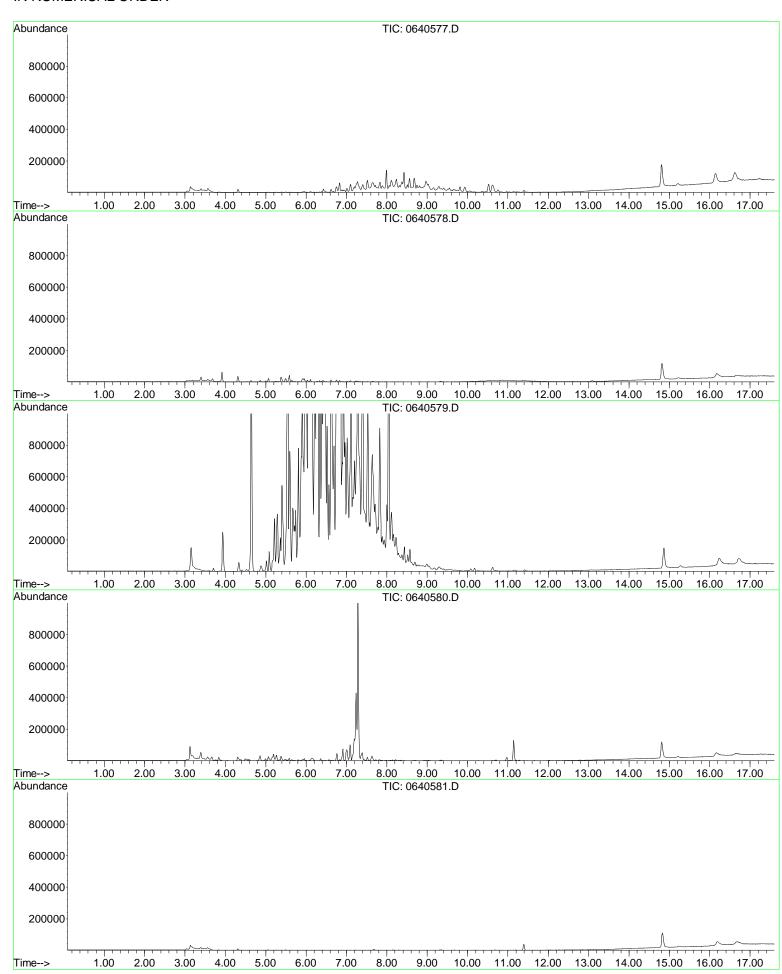
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



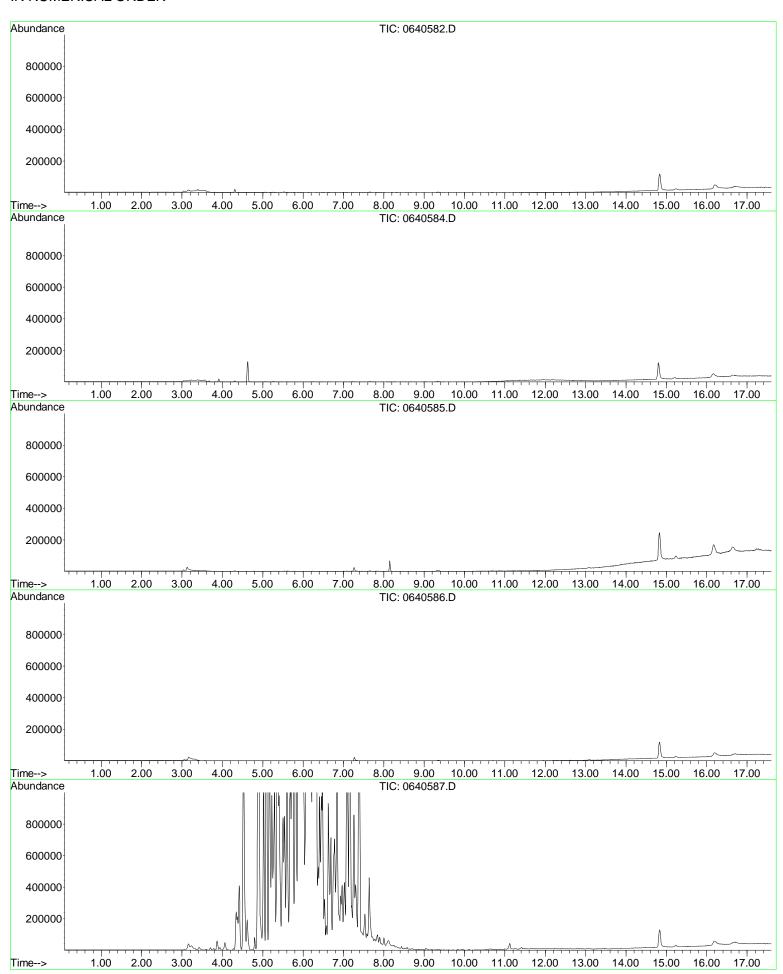
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



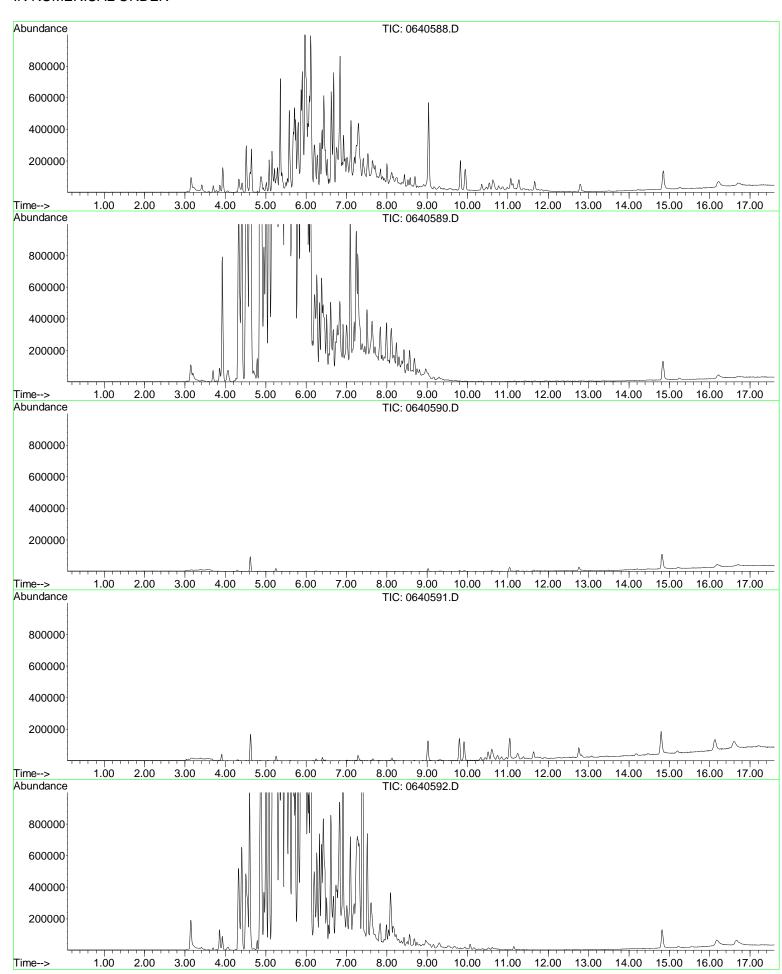
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



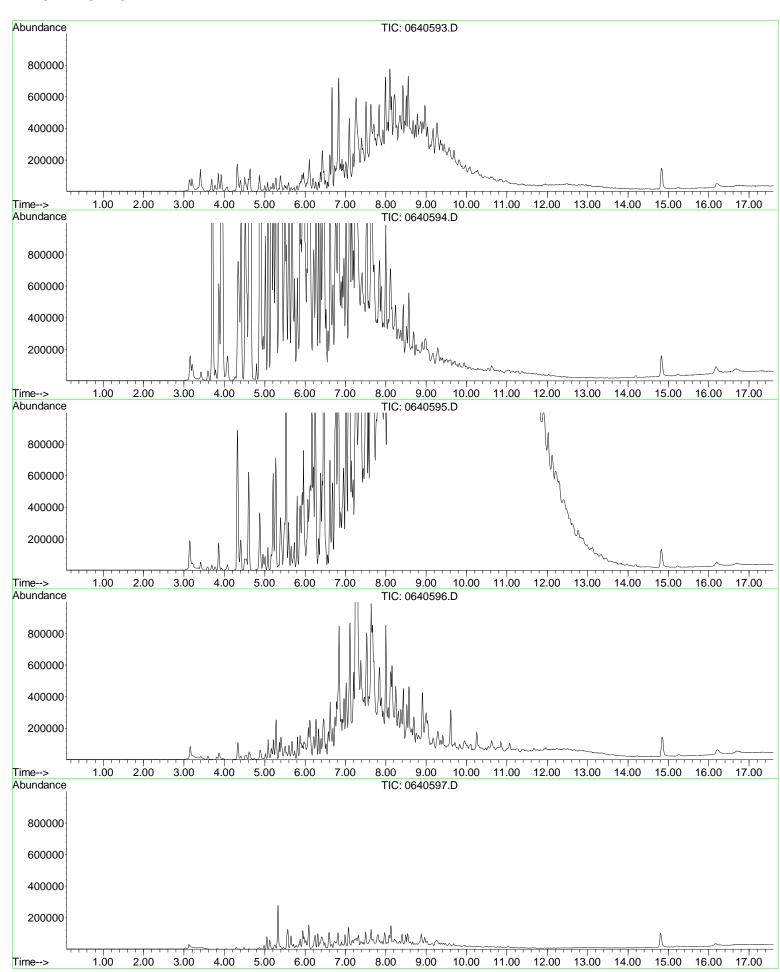
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



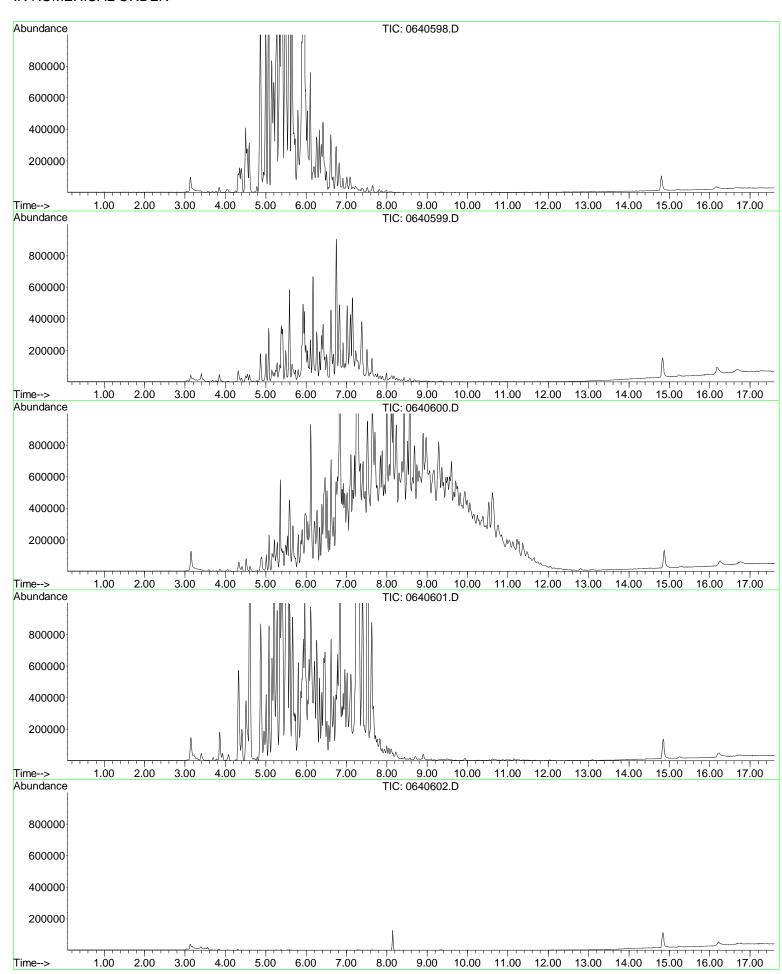
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



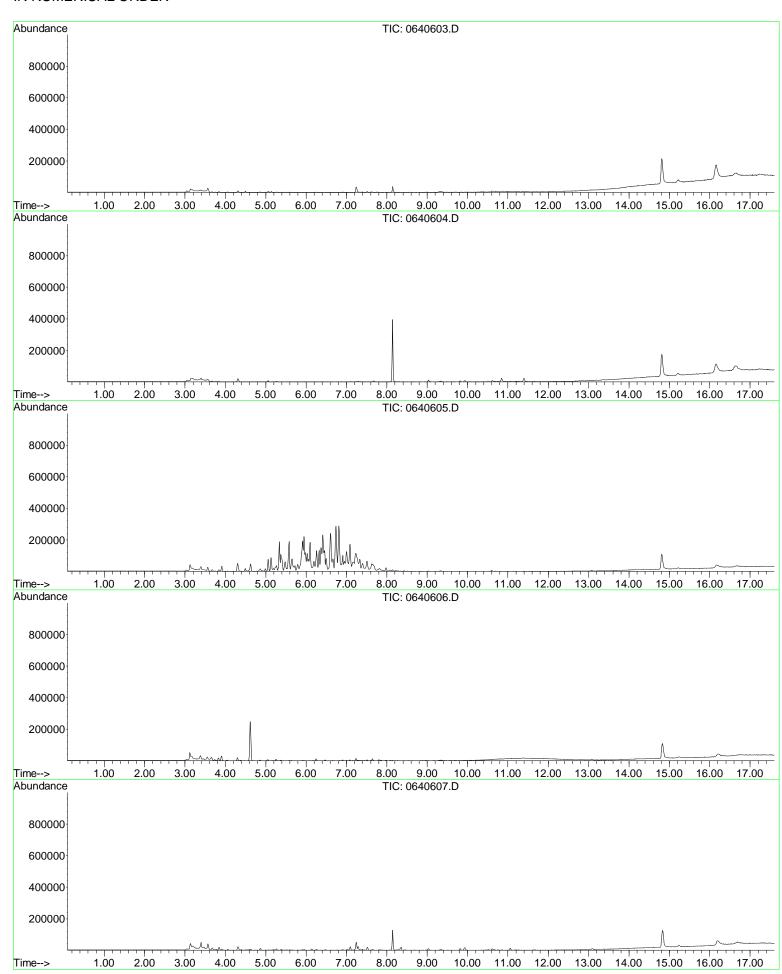
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



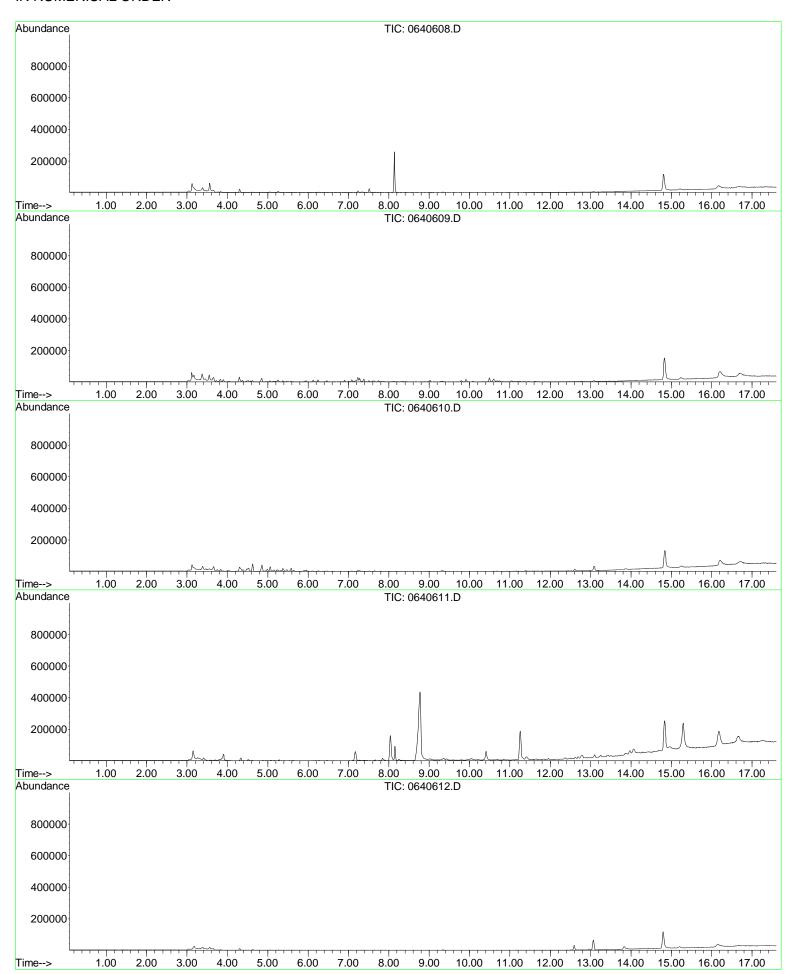
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



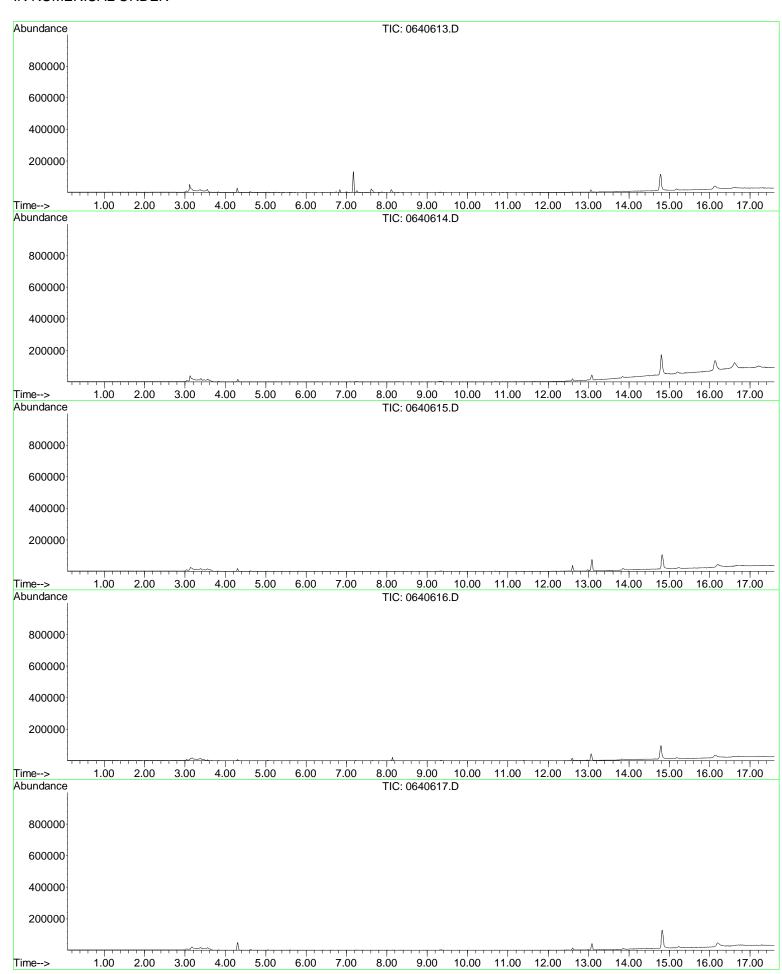
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



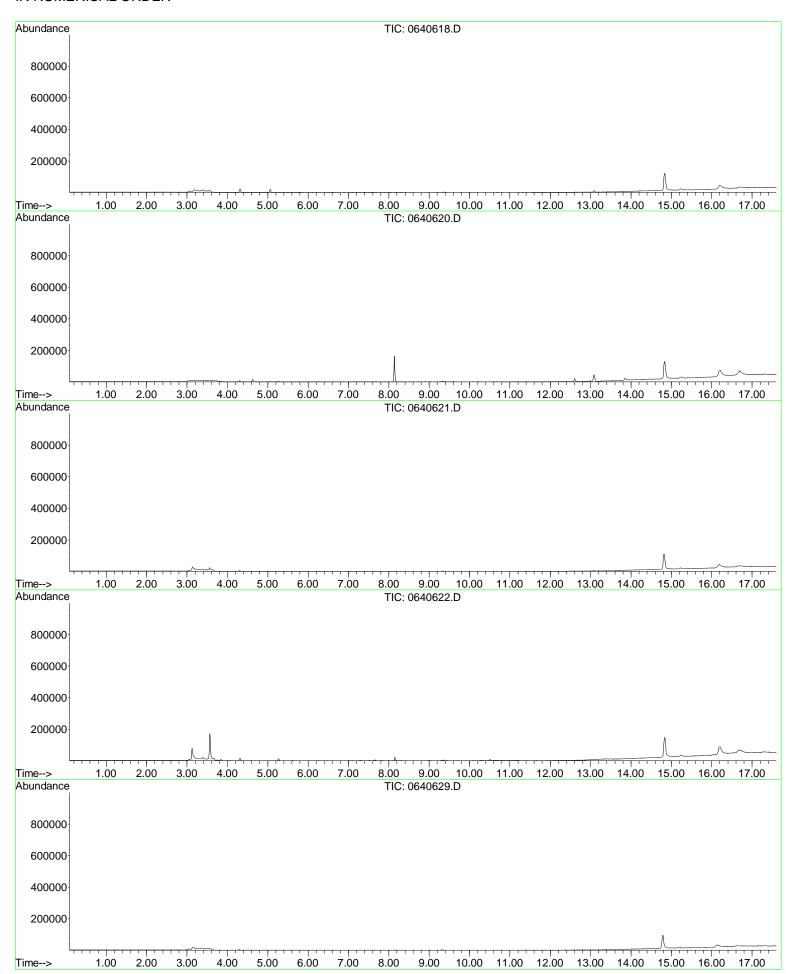
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



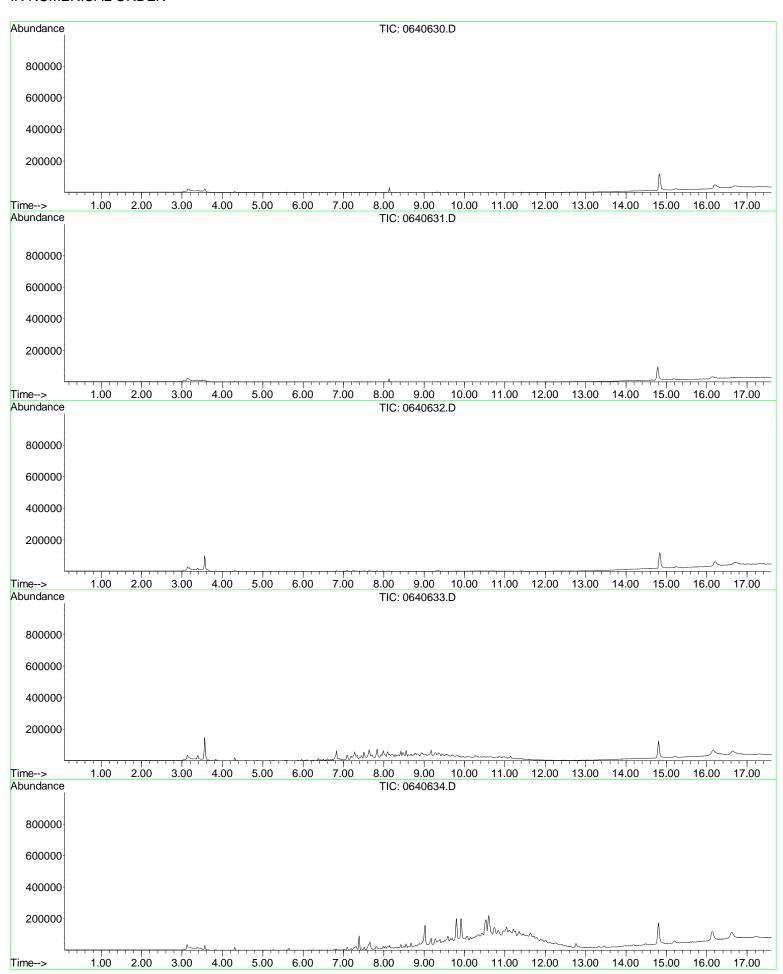
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



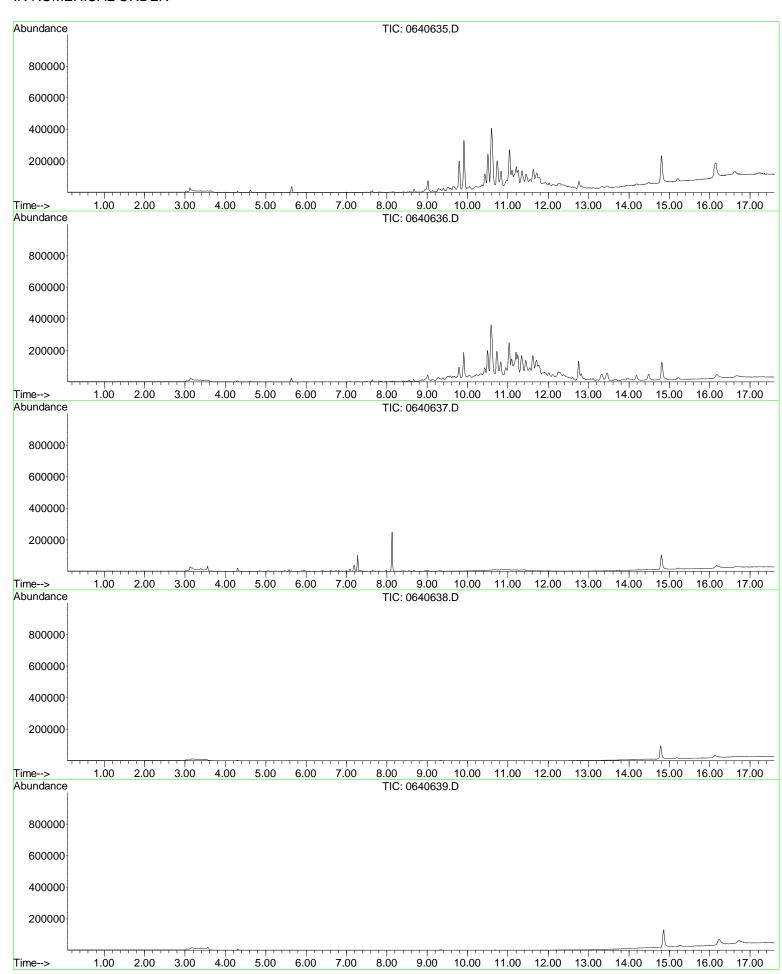
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



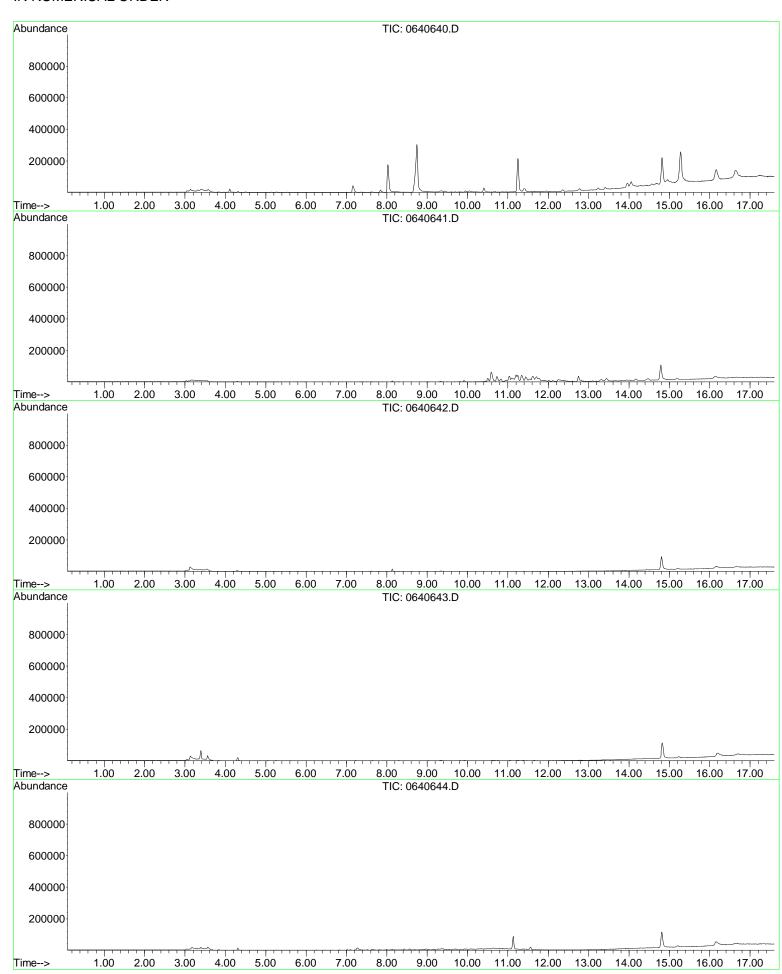
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



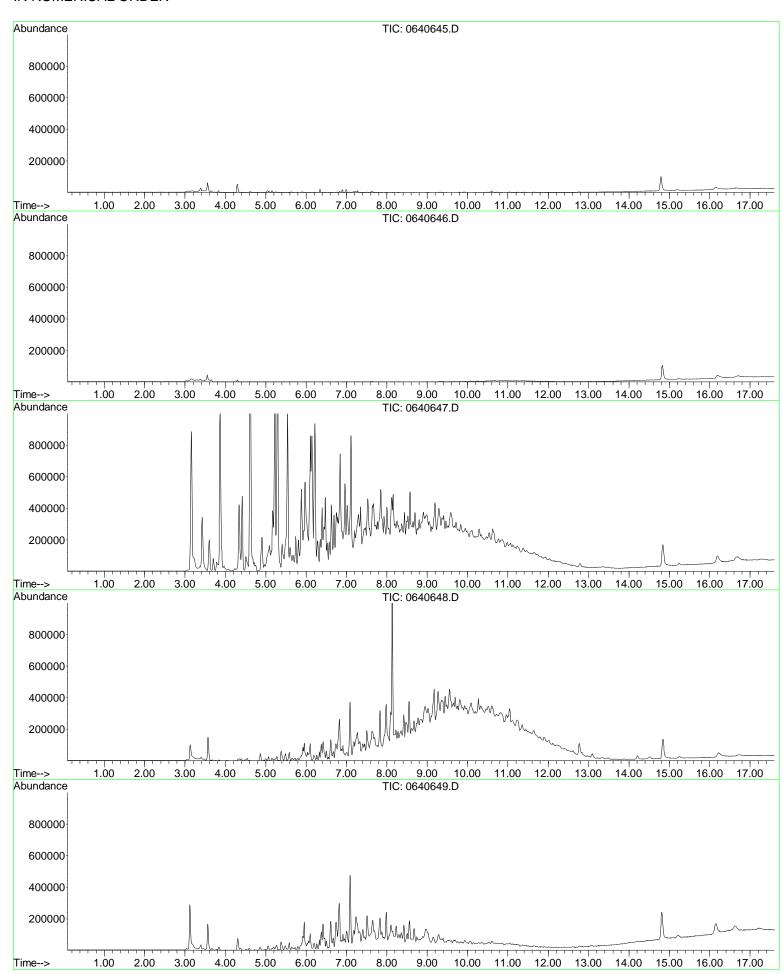
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



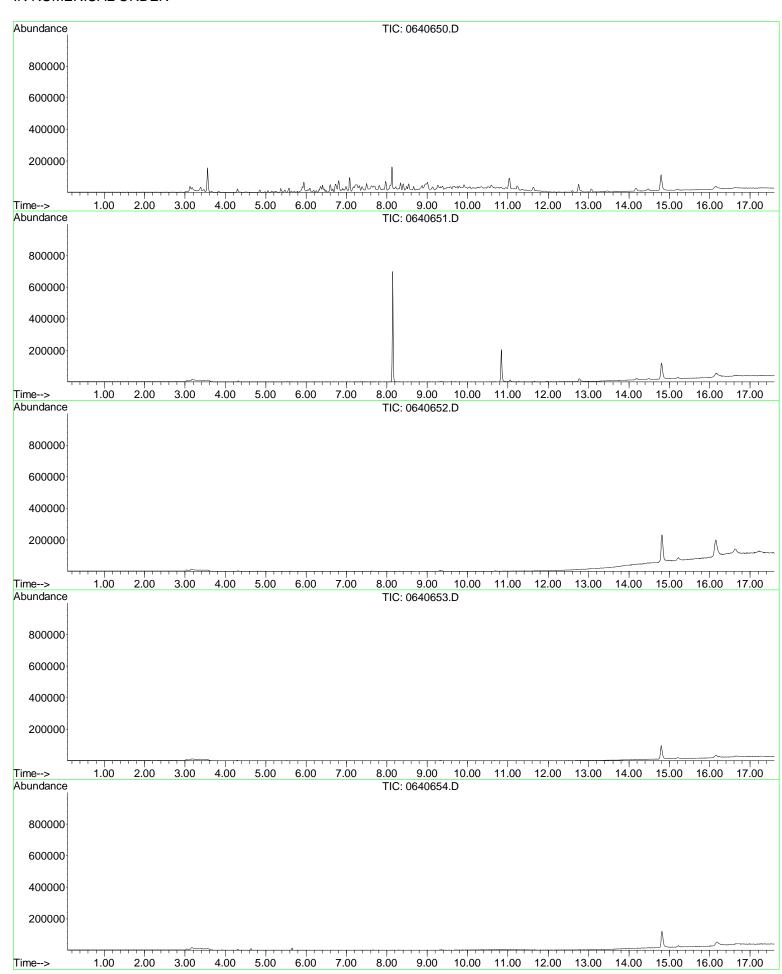
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



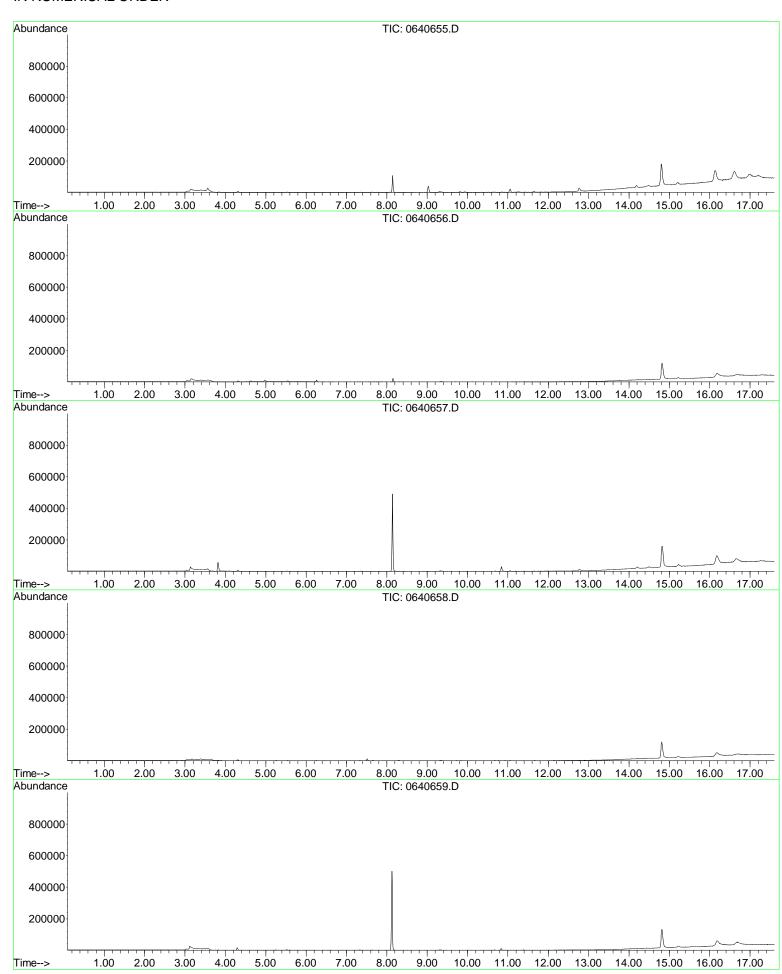
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



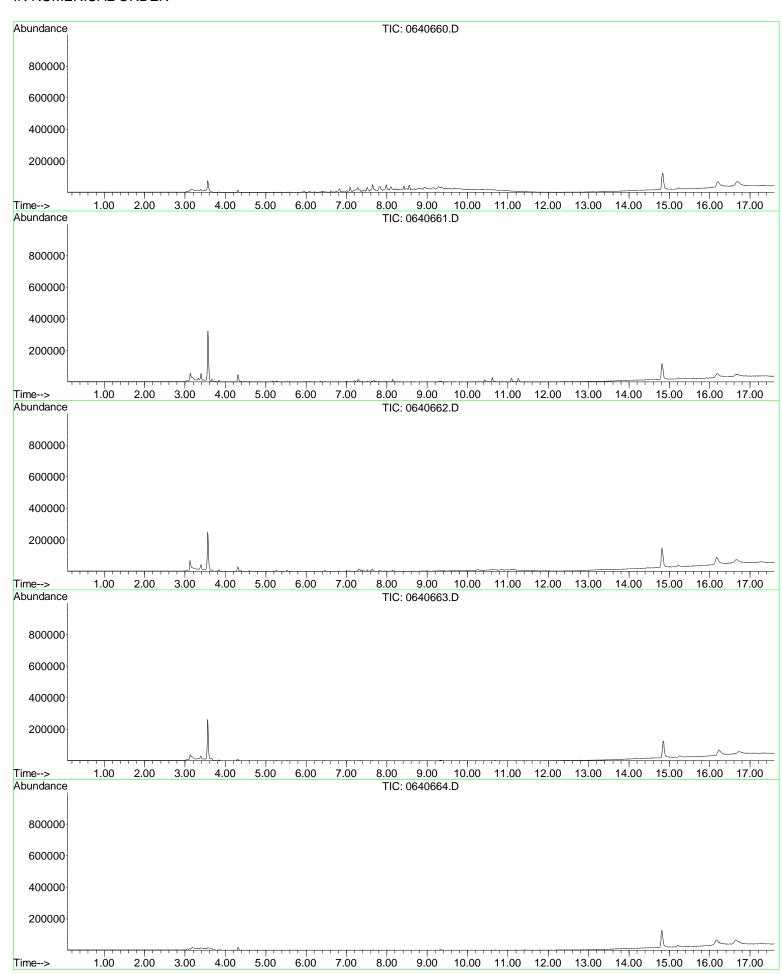
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



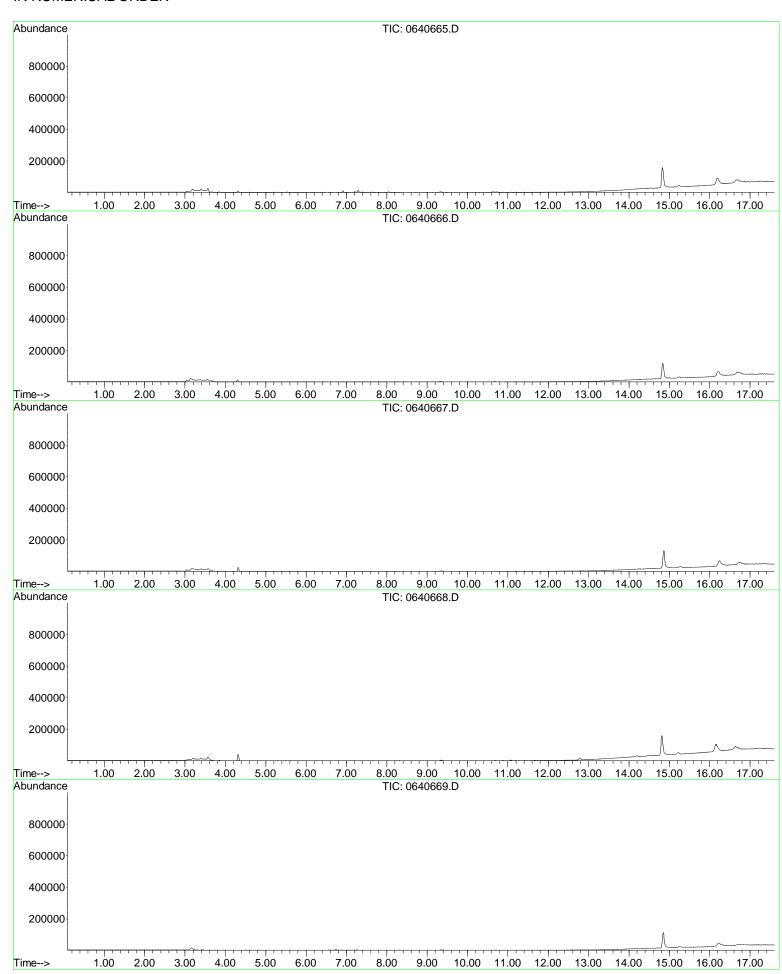
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER



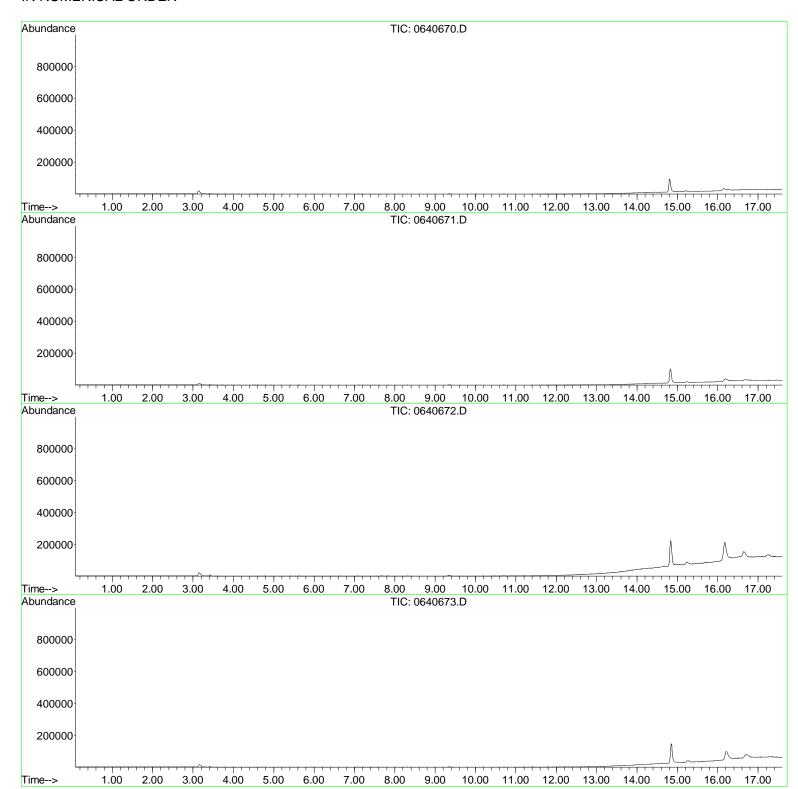
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER

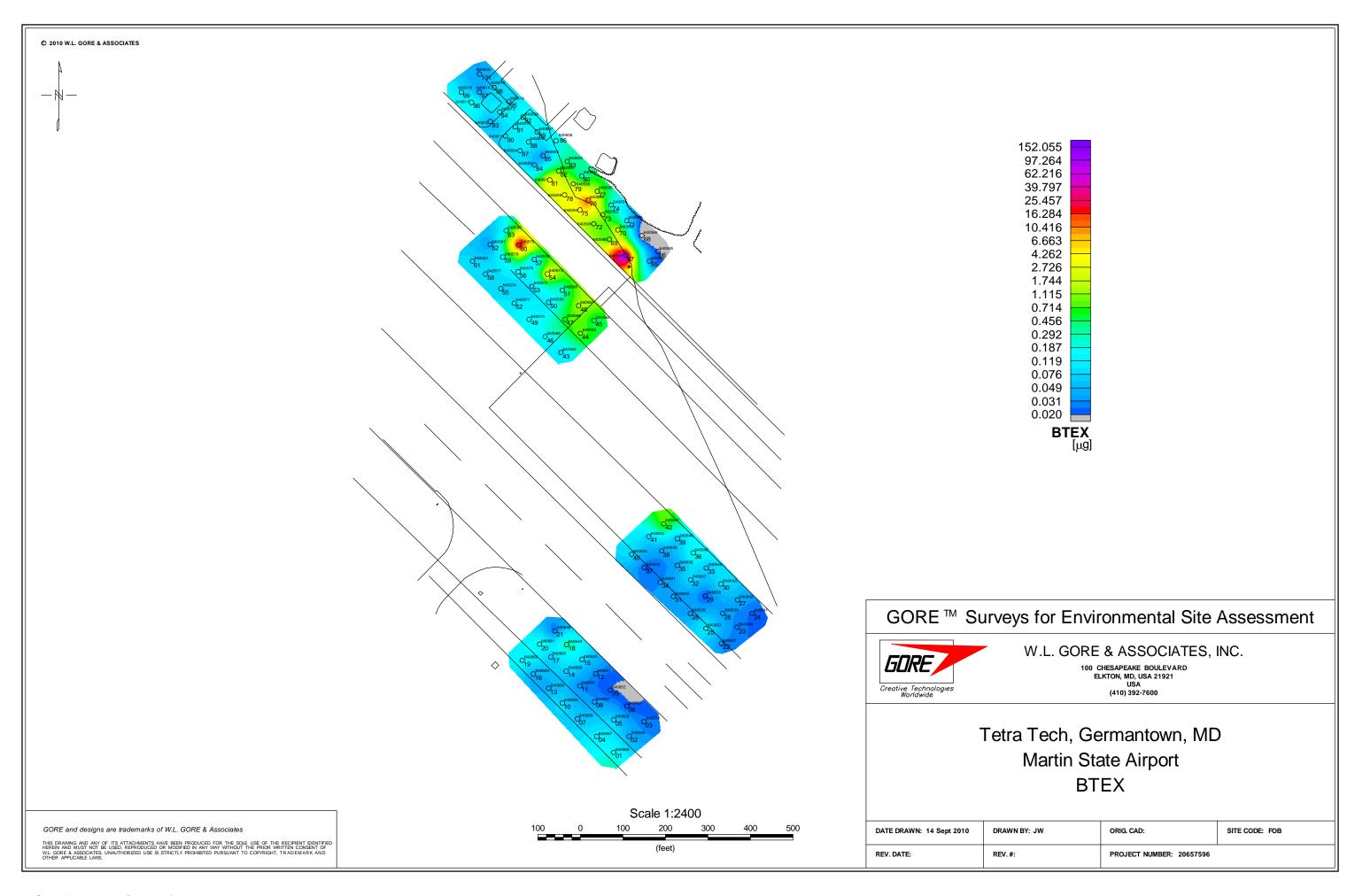


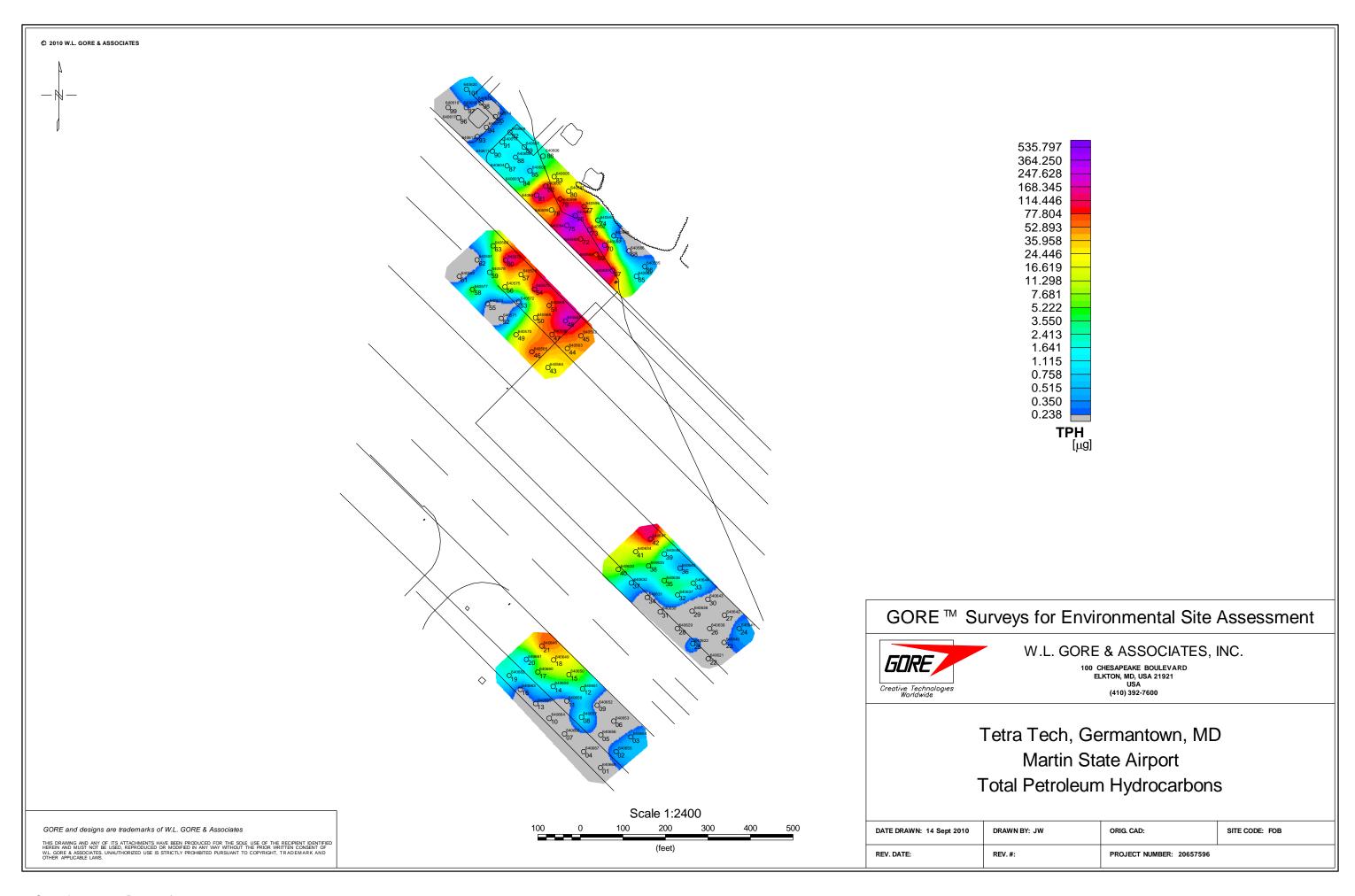
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER

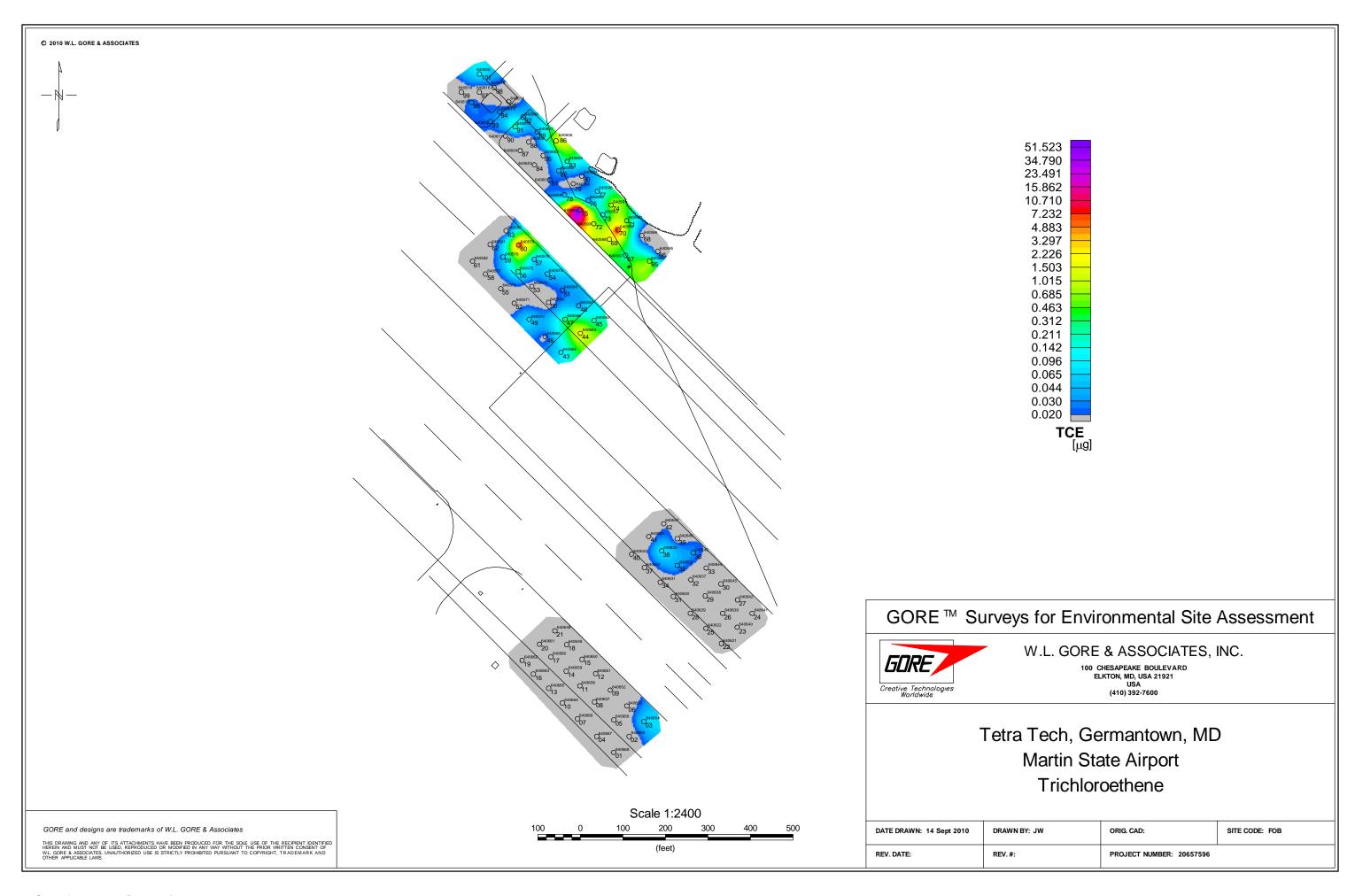


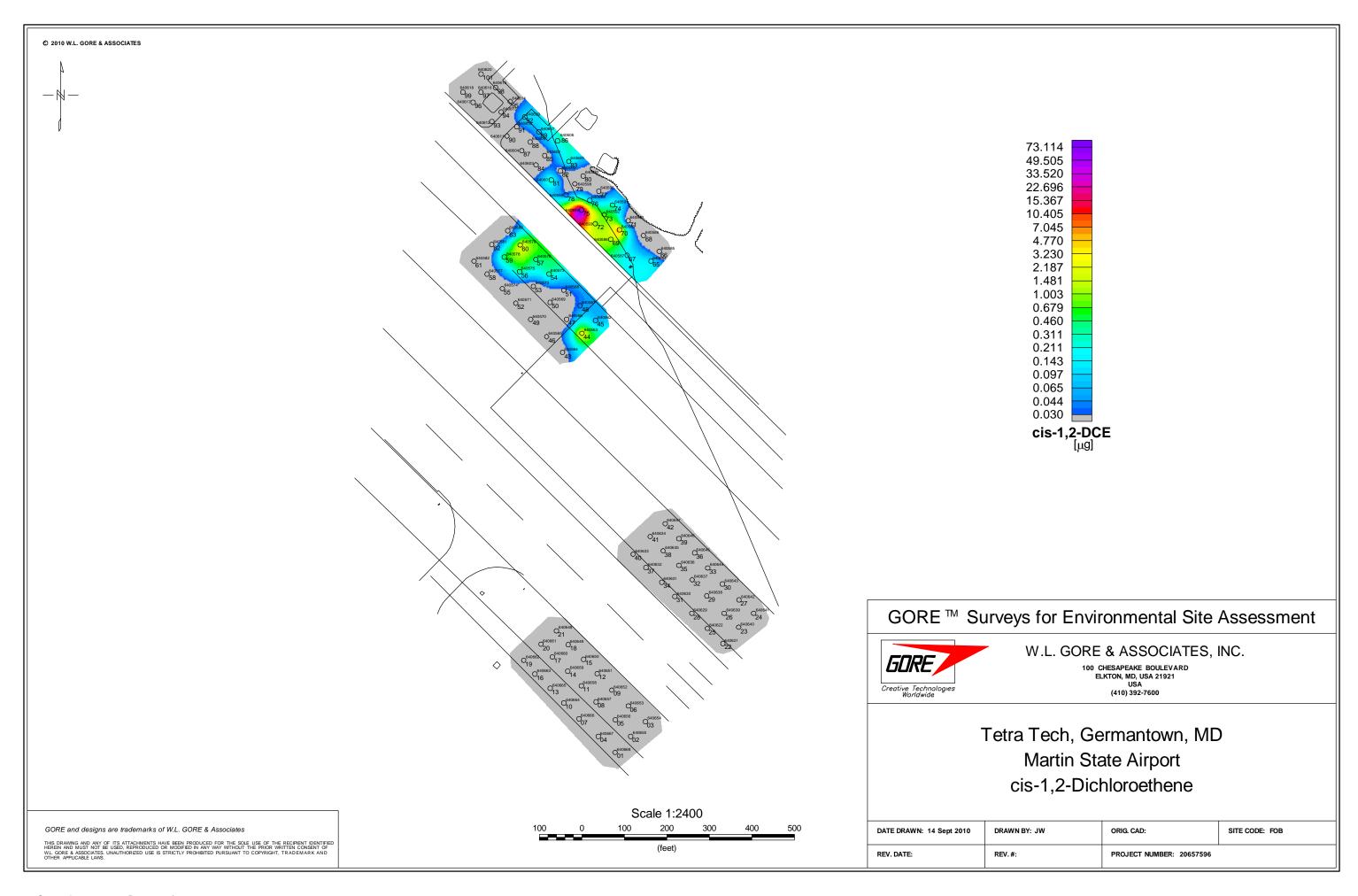
TICS - TETRA TECH NUS - PO# 20659596 IN NUMERICAL ORDER













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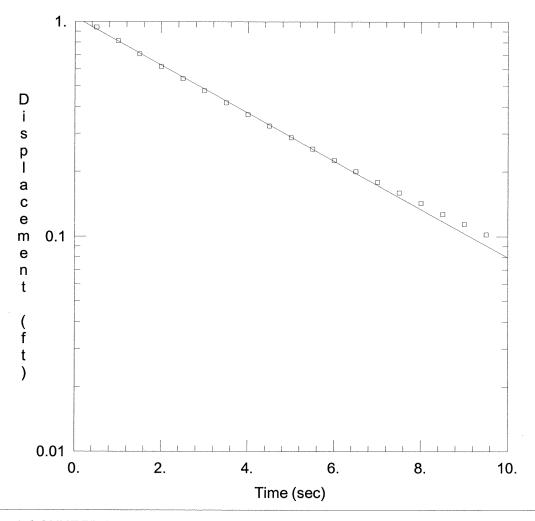
Email: environmental@wlgore.com



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APPENDIX D—SLUG TEST INFORMATION FORMS AND SLUG TEST ANALYSES



LOCKHEED MARTIN MARTIN STATE AIRPORT, MIDDLE RIVER, MARYLAND

Data Set: \...\DMW7I SlugTest1.aqt

Date: 09/10/10 Time: 13:23:07

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW7I - Test 1

Test Date: 8/5/2010

AQUIFER DATA

Saturated Thickness: 26.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW7I)

Initial Displacement: 3.701 ft

701 ft Static Water Column Height: 35.8 ft Screen Length: 10. ft

Total Well Penetration Depth: 16. ft Casing Radius: 0.083 ft

Well Radius: 0.083 ft

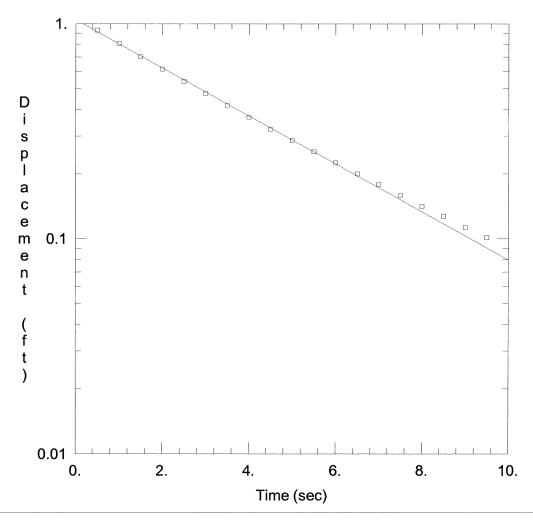
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 27.2 ft/day

y0 = 1.05 ft



LOCKHEED MARTIN MARTIN STATE AIRPORT, MIDDLE RIVER, MARYLAND

Data Set: \...\DMW7I SlugTest2.aqt

Date: 09/10/10 Time: 13:20:01

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW7I - Test 2

Test Date: 8/5/2010

AQUIFER DATA

Saturated Thickness: 26.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW7I)

Initial Displacement: 3.11 ft

Total Well Penetration Depth: 16. ft

Casing Radius: 0.083 ft

Static Water Column Height: 35.8 ft

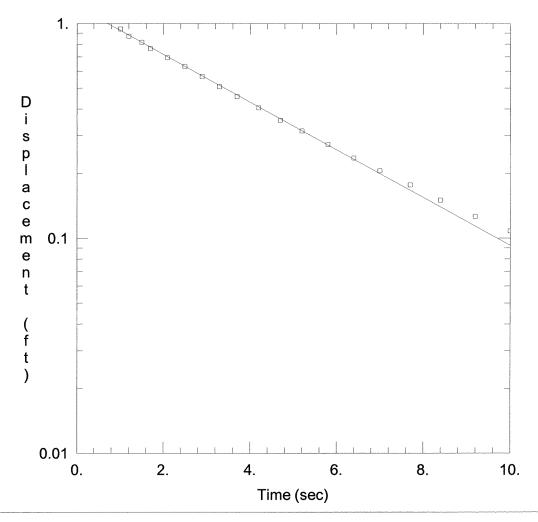
Screen Length: 10. ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 27.13 ft/day y0 = 1.042 ft



LOCKHEED MARTIN MARTIN STATE AIRPORT, MIDDLE RIVER, MARYLAND

Data Set: \...\DMW7I SlugTest3.aqt

Date: 09/10/10 Time: 13:22:05

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW7I - Test 1

Test Date: 8/5/2010

AQUIFER DATA

Saturated Thickness: 26.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW7I - Test 3)

Initial Displacement: 3.329 ft Static Water Column Height: 35.8 ft

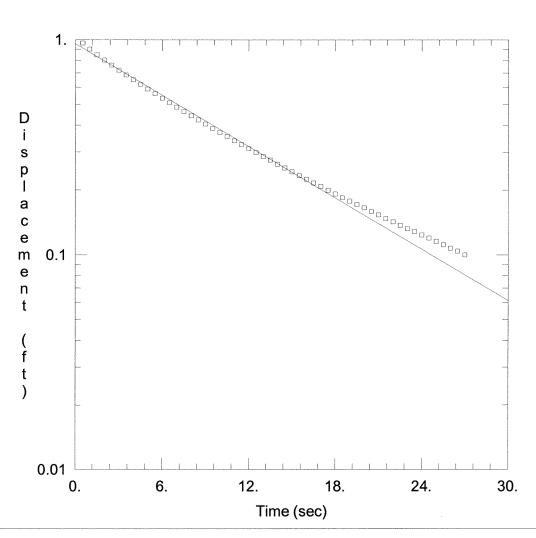
Total Well Penetration Depth: 16. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 27.01 ft/day y0 = 1.199 ft



Data Set: \...\DMW8D SlugTest1 A.aqt

Date: 09/10/10 Time: 10:40:49

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW8D - Test 1

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW8D - Test 1)

Initial Displacement: 3.67 ft Static Water Column Height: 69.7 ft

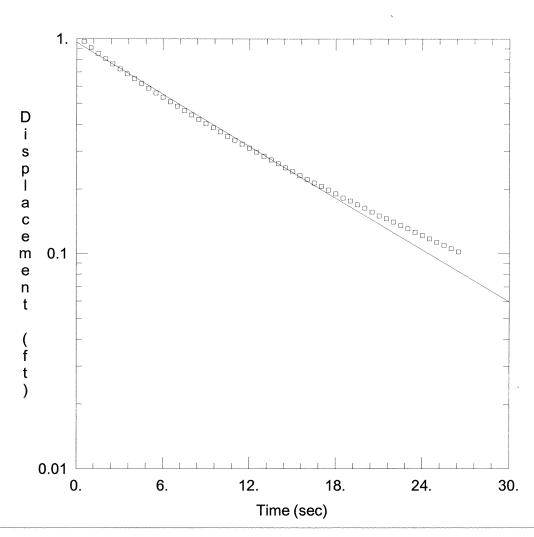
Total Well Penetration Depth: 10. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 9.36 ft/day y0 = 0.9572 ft



Data Set: \...\DMW8D SlugTest2.aqt

Date: 09/10/10 Time: 10:41:06

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW8D - Test 1

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW8D - Test 2)

Initial Displacement: 3.259 ft Static Water Column Height: 69.7 ft

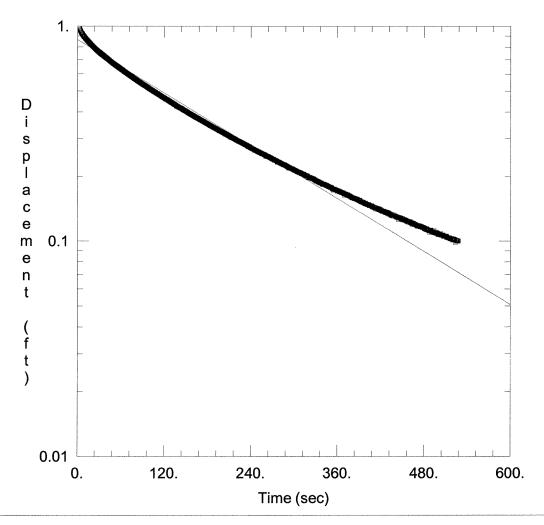
Total Well Penetration Depth: 10.7 ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aguifer Model: Confined Solution Method: Bouwer-Rice

K = 9.67 ft/day y0 = 0.9618 ft



Data Set: \...\DMW14D_SlugTest1.aqt

Date: 09/10/10 Time: 11:04:26

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW14D - Test 1

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 84. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW14D - Test 1)

Initial Displacement: 2.53 ft Static Water Column Height: 109.7 ft

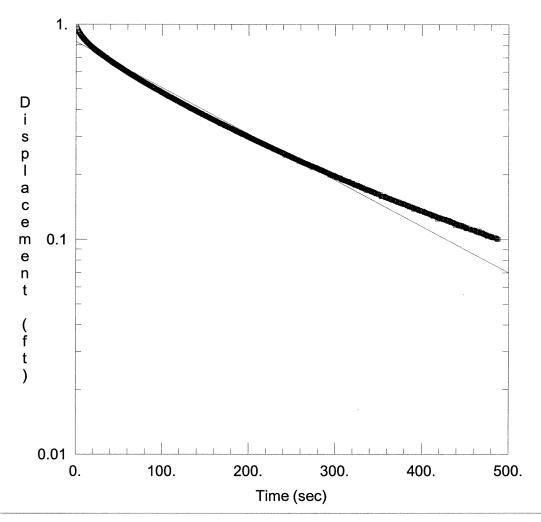
Total Well Penetration Depth: 62. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.5761 ft/day y0 = 0.8654 ft



Data Set: \...\DMW14D_SlugTest2.aqt

Date: 09/10/10 Time: 11:59:37

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW14D - Test 2

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 84. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW14D - Test 2)

Initial Displacement: 2.808 ft Static Water Column Height: 109.7 ft

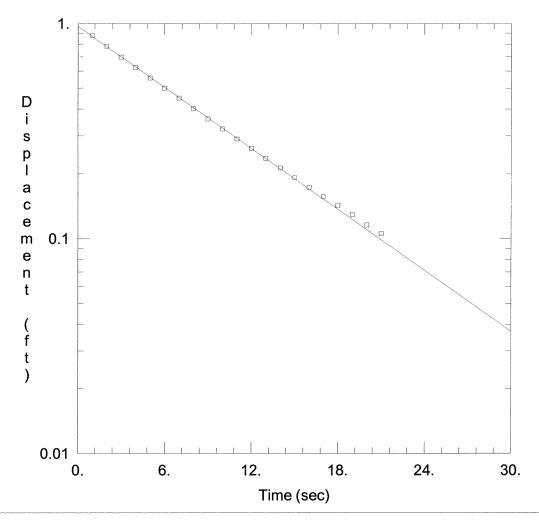
Total Well Penetration Depth: 62. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aguifer Model: Confined Solution Method: Bouwer-Rice

K = 0.6026 ft/day y0 = 0.8302 ft



Data Set: \...\DMW15D SlugTest1.aqt

Date: 09/10/10 Time: 10:41:54

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW15D - Test 1

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 17.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW15D - Test 1)

Initial Displacement: 1.678 ft Static Water Column Height: 57.37 ft

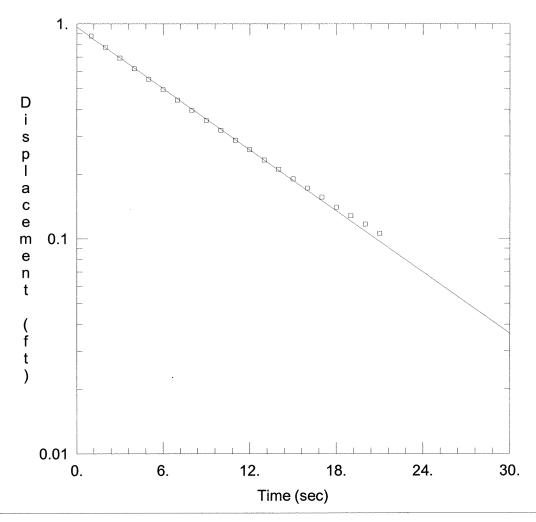
Total Well Penetration Depth: 17.5 ft Screen Length: 5. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 25.36 ft/day y0 = 0.9698 ft



Data Set: \...\DMW15D_SlugTest2.aqt

Date: 09/10/10 Time: 10:42:08

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW15D - Test 2

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 17.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW15D - Test 2)

Initial Displacement: 2.962 ft

Static Water Column Height: 57.37 ft

Total Well Penetration Depth: 17.5 ft

Screen Length: 5. ft Well Radius: 0.083 ft

Casing Radius: 0.083 ft

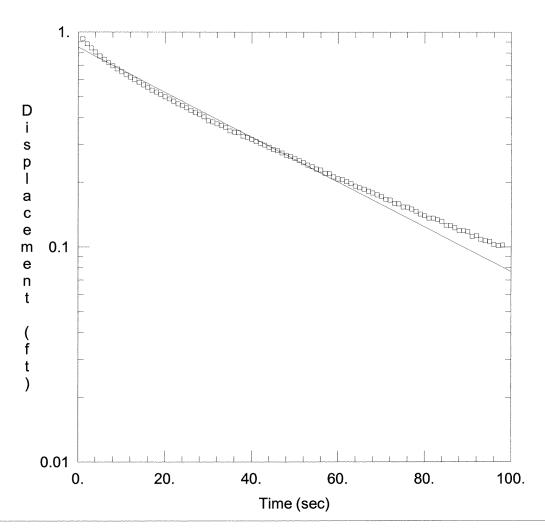
SOLUTION

Aguifer Model: Confined

Solution Method: Bouwer-Rice

K = 25.48 ft/day

y0 = 0.9641 ft



Data Set: \...\DMW16D SlugTest1.aqt

Date: 09/10/10 Time: 10:42:27

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW16D - Test 1

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 6. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW16D - Test 1)

Initial Displacement: 1.991 ft Static Water Column Height: 59.77 ft

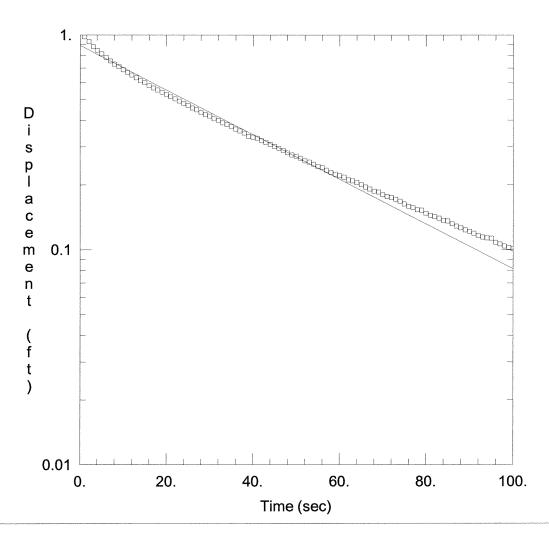
Total Well Penetration Depth: 10. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 4.31 ft/day y0 = 0.8496 ft



Data Set: \...\DMW16D SlugTest2.aqt

Date: 09/10/10 Time: 10:42:42

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW16D - Test 2

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 6. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW16D - Test 2)

Initial Displacement: 2.099 ft Static Water Column Height: 59.77 ft

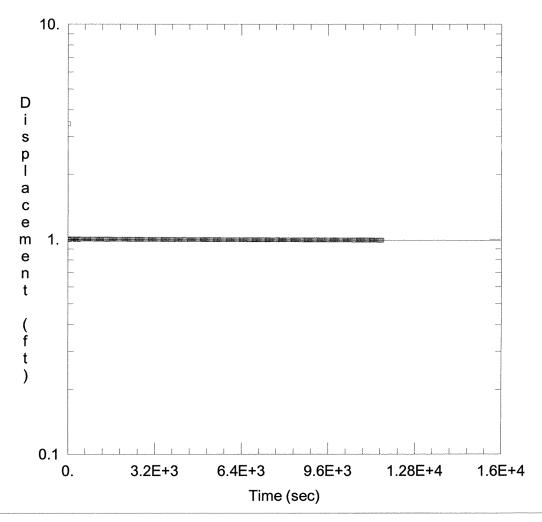
Total Well Penetration Depth: 10. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aguifer Model: Confined Solution Method: Bouwer-Rice

K = 4.287 ft/day y0 = 0.8927 ft



Data Set: \...\DMW17D_SlugTest1.aqt

Date: 09/10/10 Time: 13:01:33

PROJECT INFORMATION

Company: Tetra Tech Client: Lockheed Martin Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW17D - Test 1

Test Date: 8/3/2010

AQUIFER DATA

Saturated Thickness: 10. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW17D - Test 1)

Initial Displacement: 3.44 ft Static Water Column Height: 63.14 ft

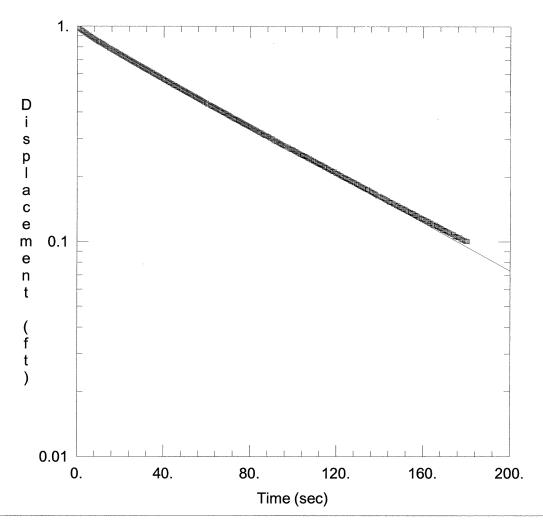
Total Well Penetration Depth: 10. ft Screen Length: 10. ft Casing Radius: 0.083 ft

Well Radius: 0.083 ft

SOLUTION

Solution Method: Bouwer-Rice Aguifer Model: Confined

y0 = 0.9966 ftK = 6.678E-5 ft/day



Data Set: \...\DMW18D SlugTest1.aqt

Date: <u>09/10/10</u> Time: <u>10:43:18</u>

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW18D - Test 1

Test Date: 8/3/2010

AQUIFER DATA

Saturated Thickness: 5. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW18D - Test 1)

Initial Displacement: 3.079 ft Static Water Column Height: 75.65 ft

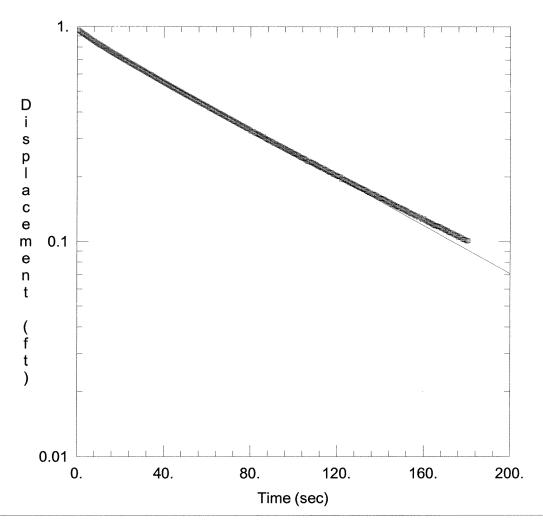
Total Well Penetration Depth: 10. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 2.743 ft/day y0 = 0.9607 ft



Data Set: \...\DMW18D SlugTest2.aqt

Date: 09/10/10 Time: 10:43:34

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW18D - Test 2

Test Date: 8/3/2010

AQUIFER DATA

Saturated Thickness: 5. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW18D - Test 2)

Initial Displacement: 2.626 ft Static Water Column Height: 75.65 ft

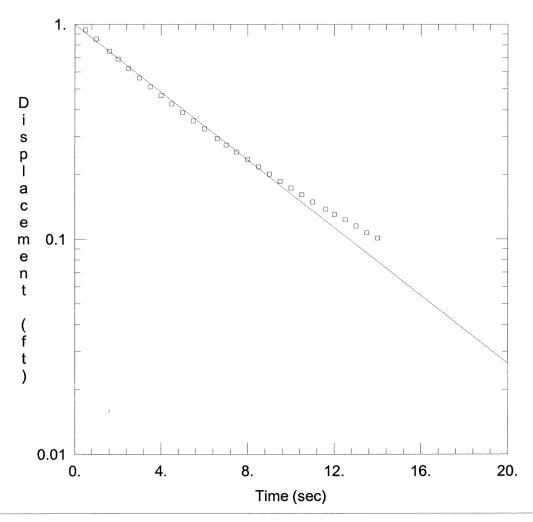
Total Well Penetration Depth: 10. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 2.75 ft/day y0 = 0.9356 ft



Data Set: \...\DMW19D SlugTest1.aqt

Date: 09/10/10 Time: 10:43:52

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW19D - Test 1

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 38. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW19D - Test 1)

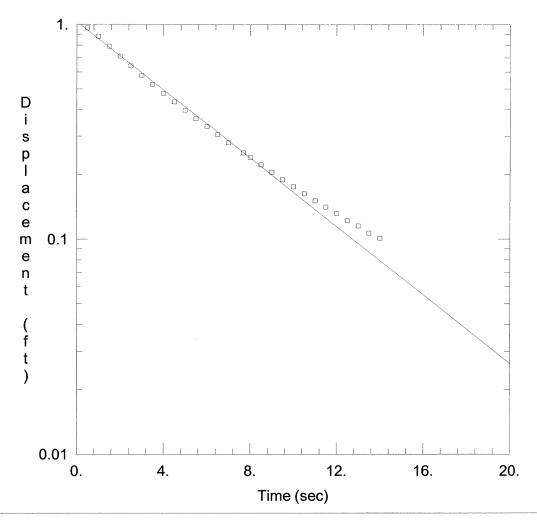
Initial Displacement: 3.51 ft Static Water Column Height: 72.74 ft

Total Well Penetration Depth: 18. ft Screen Length: 10. ft Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 19.17 ft/day y0 = 0.9987 ft



Data Set: \...\DMW19D_SlugTest2.aqt

Date: 09/10/10 Time: 10:44:07

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW19D - Test 2

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 38. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW19D - Test 2)

Initial Displacement: 3.22 ft Static Water Column Height: 72.74 ft

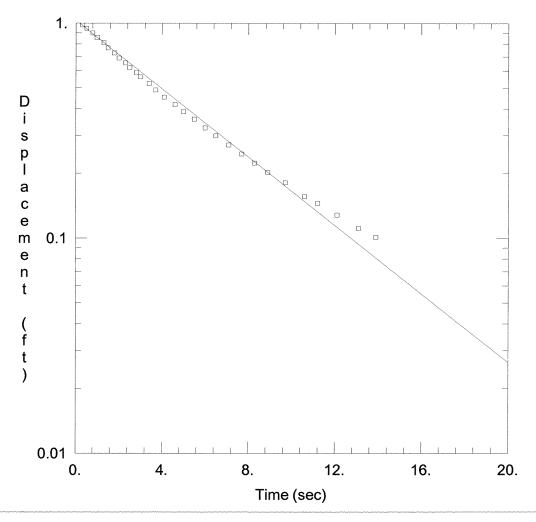
Total Well Penetration Depth: 18. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aguifer Model: Confined Solution Method: Bouwer-Rice

K = 19.34 ft/day y0 = 1.031 ft



Data Set: \...\DMW19D SlugTest3.aqt

Date: 09/10/10 Time: 10:44:21

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW19D - Test 3

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 38. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW19D - Test 3)

Initial Displacement: 3.12 ft Static Water Column Height: 72.74 ft

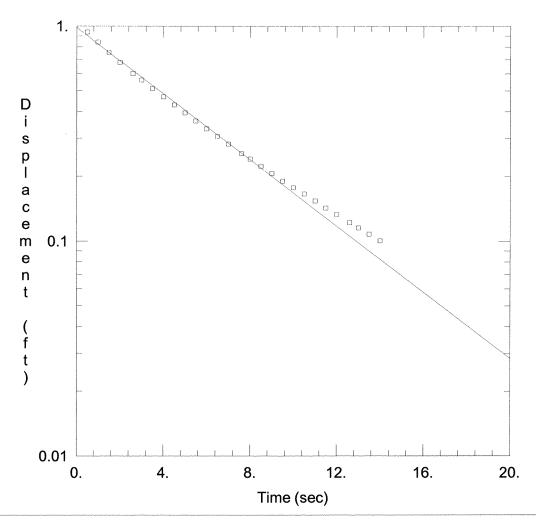
Total Well Penetration Depth: 18. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 19.34 ft/day y0 = 1.031 ft



Data Set: \...\DMW20D_SlugTest1.aqt

Date: 09/10/10 Time: 10:44:35

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW20D - Test 1

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 17. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW20D - Test 1)

Initial Displacement: 3.942 ft Static Water Column Height: 61.6 ft

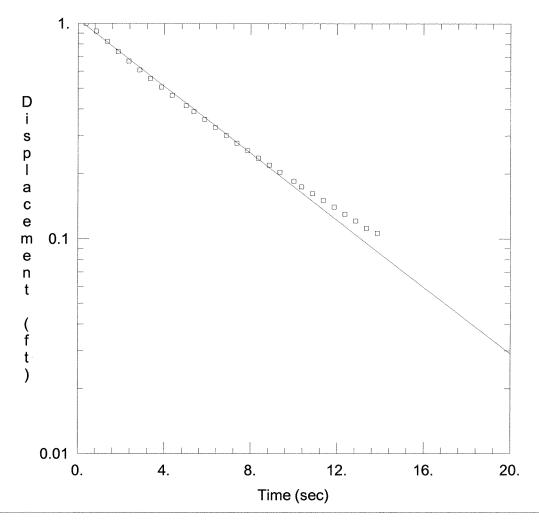
Total Well Penetration Depth: 12. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 18.23 ft/day y0 = 0.9838 ft



Data Set: \...\DMW20D SlugTest2.aqt

Date: <u>09/10/10</u> Time: <u>10:44:48</u>

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW20D - Test 2

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 17. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW20D - Test 2)

Initial Displacement: 2.995 ft Static Water Column Height: 61.6 ft

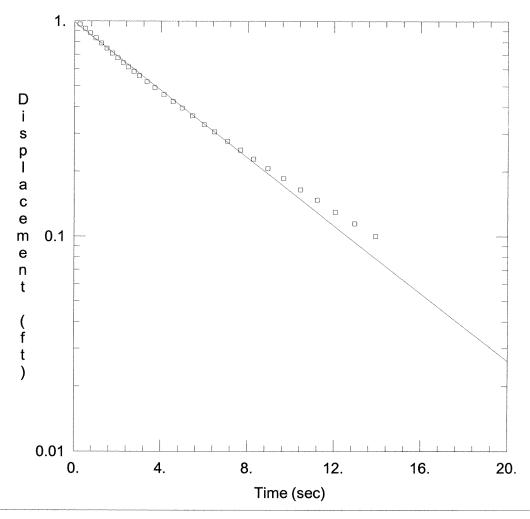
Total Well Penetration Depth: 12. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 18.43 ft/day y0 = 1.043 ft



Data Set: \...\DMW20D_SlugTest3.aqt

Date: 09/10/10 Time: 10:45:05

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW20D - Test 3

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 17. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW20D - Test 3)

Initial Displacement: 3.8 ft

Static Water Column Height: 61.6 ft

Total Well Penetration Depth: 12. ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.083 ft

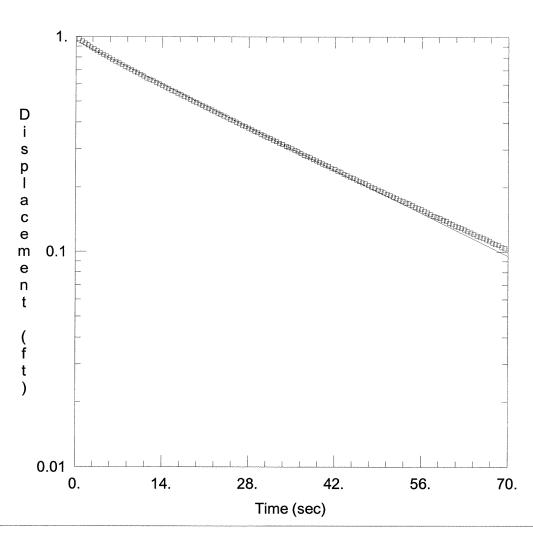
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 18.69 ft/day

y0 = 0.9882 ft



Data Set: \...\DMW21D SlugTest1.aqt

Date: <u>09/10/10</u> Time: <u>10:45:35</u>

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW21D - Test 1

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 25. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW21D - Test 1)

Initial Displacement: 2.442 ft Static Water Column Height: 70.21 ft

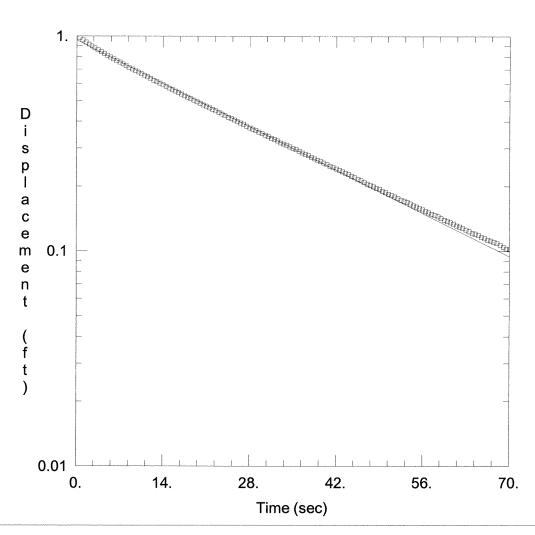
Total Well Penetration Depth: 10. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 3.211 ft/day y0 = 0.9528 ft



Data Set: \...\DMW21D SlugTest2.aqt

Date: 09/10/10 Time: 10:45:51

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW21D - Test 2

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 25. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW21D - Test 2)

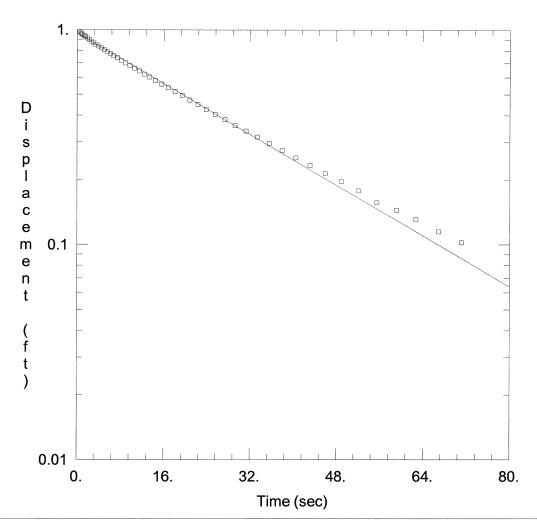
Initial Displacement: 2.635 ft Static Water Column Height: 70.21 ft

Total Well Penetration Depth: 10. ft Screen Length: 10. ft Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 3.235 ft/day y0 = 0.9581 ft



Data Set: \...\DMW21D_SlugTest3.aqt

Date: <u>09/10/10</u> Time: <u>10:46:09</u>

PROJECT INFORMATION

Company: Tetra Tech Client: Lockheed Martin Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW21D - Test 3

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 25. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW21D - Test 3)

Initial Displacement: 2.351 ft Static Water Column Height: 70.21 ft

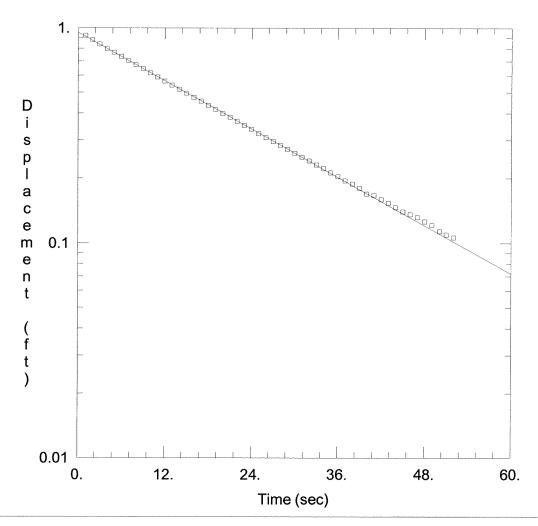
Total Well Penetration Depth: 10. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 3.314 ft/day y0 = 0.9653 ft



Data Set: \...\DMW22D SlugTest1.aqt

Date: <u>09/10/10</u> Time: 10:46:24

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW22D - Test 1

Test Date: 8/2/2010

AQUIFER DATA

Saturated Thickness: 29. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW22D - Test 1)

Initial Displacement: 2.071 ft Static Water Column Height: 70. ft

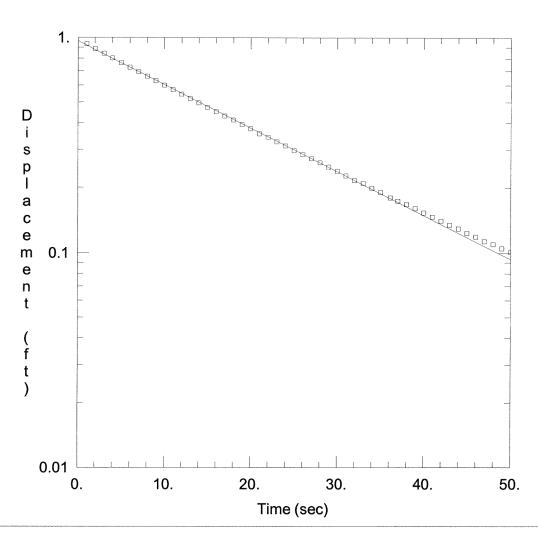
Total Well Penetration Depth: 13. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 4.366 ft/day y0 = 0.9517 ft



Data Set: \...\DMW22D_SlugTest2.aqt

Date: <u>09/10/10</u> Time: 10:46:42

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW22D - Test 2

Test Date: 8/2/2010

AQUIFER DATA

Saturated Thickness: 29. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW22D - Test 2)

Initial Displacement: 2.518 ft Static Water Column Height: 70. ft

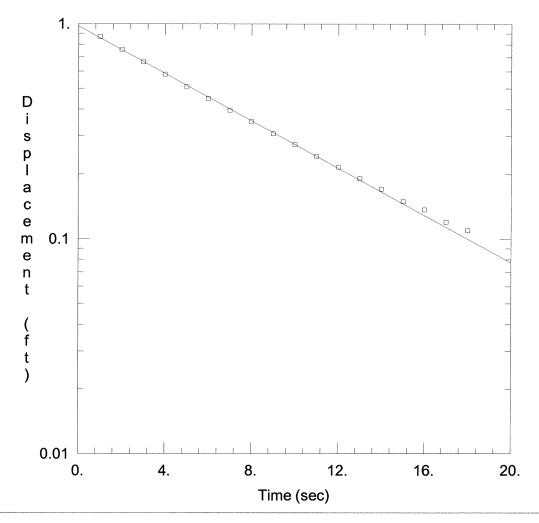
Total Well Penetration Depth: 13. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 4.738 ft/day y0 = 0.9642 ft



Data Set: \...\DMW23D SlugTest1.aqt

Date: 09/10/10 Time: 10:46:59

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW23D - Test 1

Test Date: 8/2/2010

AQUIFER DATA

Saturated Thickness: 35. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW23D - Test 1)

Initial Displacement: 1.821 ft Static Water Column Height: 76.85 ft

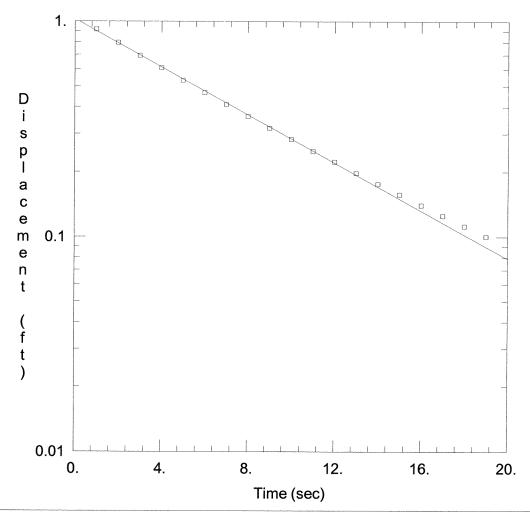
Total Well Penetration Depth: 26. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 14.3 ft/day y0 = 0.9747 ft



Data Set: \...\DMW23D_SlugTest2.aqt

Date: 09/10/10 Time: 10:47:15

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW23D - Test 2

Test Date: 8/2/2010

AQUIFER DATA

Saturated Thickness: 35. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW23D - Test 2)

Initial Displacement: 2.534 ft

Static Water Column Height: 76.85 ft

Total Well Penetration Depth: 26. ft

Screen Length: 10. ft Well Radius: 0.083 ft

Casing Radius: 0.083 ft

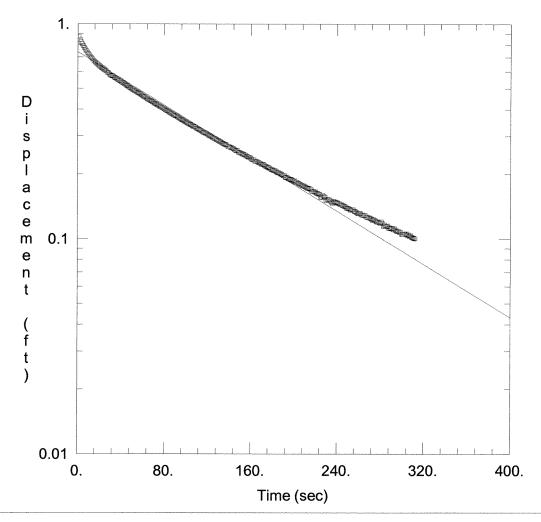
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 14.48 ft/day

y0 = 1.025 ft



Data Set: \...\DMW24S SlugTest1.aqt

Date: <u>09/10/10</u> Time: <u>10:48:13</u>

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW24S - Test 1

Test Date: 8/3/2010

AQUIFER DATA

Saturated Thickness: 7. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW24S - Test 1)

Initial Displacement: 1.836 ft

Static Water Column Height: 19.5 ft

Total Well Penetration Depth: 10. ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.083 ft

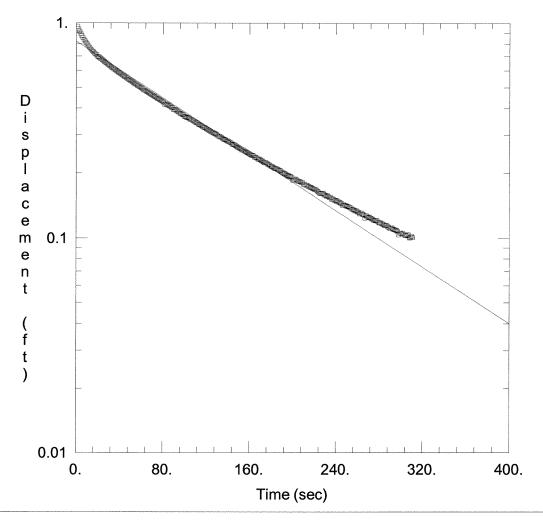
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 1.1 ft/day

y0 = 0.7403 ft



Data Set: \...\DMW24S SlugTest2.agt

Date: 09/10/10 Time: 10:48:28

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW24S - Test 2

Test Date: 8/3/2010

AQUIFER DATA

Saturated Thickness: 7. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW24S - Test 2)

Initial Displacement: 2.053 ft Static Water Column Height: 19.5 ft

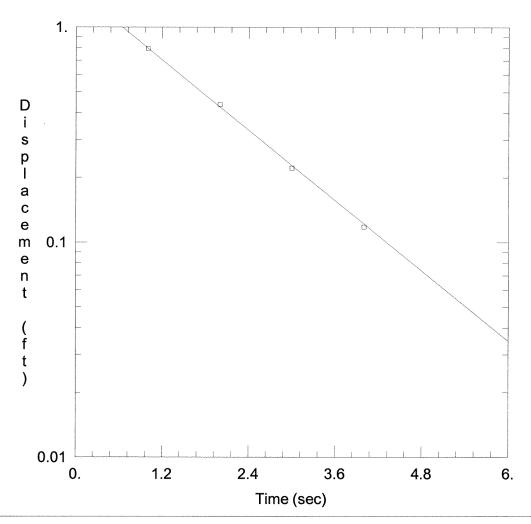
Total Well Penetration Depth: 10. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 1.167 ft/day y0 = 0.82 ft



Data Set: \...\DMW24I_SlugTest1.aqt

Date: 09/10/10 Time: 10:47:30

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW24I - Test 1

Test Date: 8/3/2010

AQUIFER DATA

Saturated Thickness: 39. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW24I - Test 1)

Initial Displacement: 2.429 ft Static Water Column Height: 38.54 ft

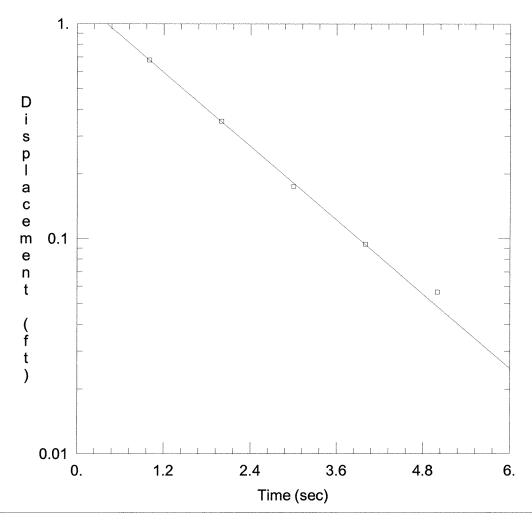
Total Well Penetration Depth: 15. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 64.3 ft/day y0 = 1.494 ft



Data Set: \...\DMW24I SlugTest2.aqt

Date: 09/10/10 Time: 10:47:46

PROJECT INFORMATION

Company: <u>Tetra Tech</u> Client: <u>Lockheed Martin</u> Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW24I - Test 2

Test Date: 8/3/2010

AQUIFER DATA

Saturated Thickness: 39. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW24I - Test 2)

Initial Displacement: 3.015 ft Static Water Column Height: 38.54 ft

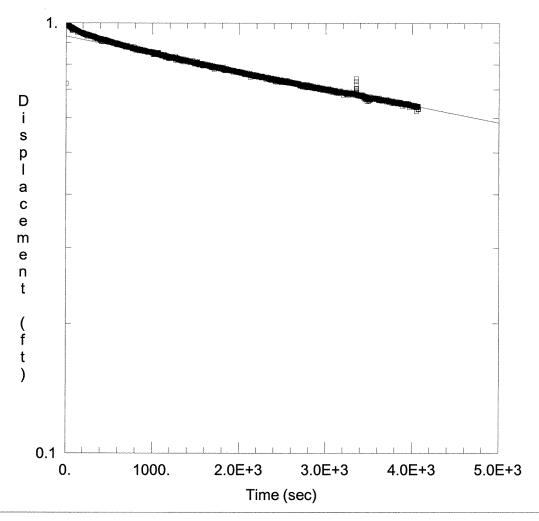
Total Well Penetration Depth: 15. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 67.7 ft/day y0 = 1.312 ft



Data Set: \...\DMW26D SlugTest1.agt

Date: 09/10/10 Time: 13:00:49

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW26D - Test 1

Test Date: 8/3/2010

AQUIFER DATA

Saturated Thickness: 2. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW26D - Test 1)

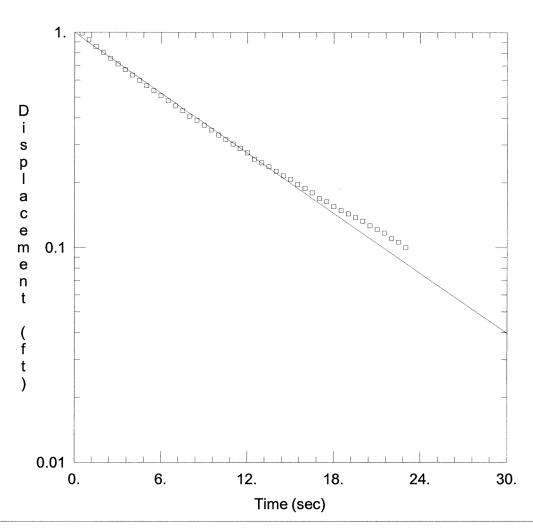
Initial Displacement: 0.723 ft Static Water Column Height: 57.45 ft

Total Well Penetration Depth: 2. ft Screen Length: 2. ft Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.03288 ft/day y0 = 0.9313 ft



Data Set: \...\DMW32I_SlugTest1.aqt

Date: 09/10/10 Time: 10:49:19

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW32I - Test 1

Test Date: 8/3/2010

AQUIFER DATA

Saturated Thickness: 53.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW32I - Test 1)

Initial Displacement: 2.489 ft Static Water Column Height: 53.5 ft

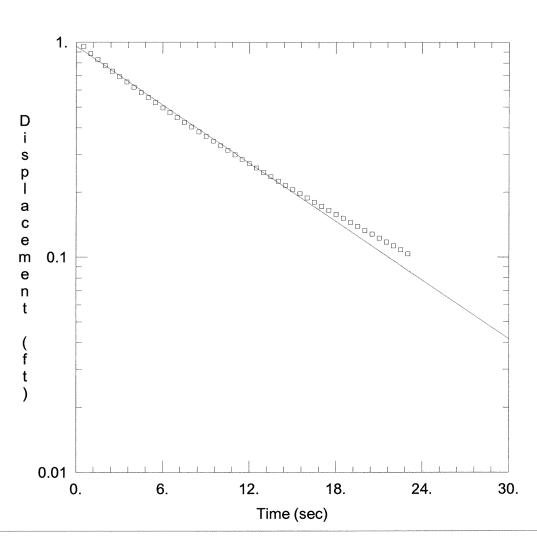
Total Well Penetration Depth: 49.5 ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aguifer Model: Confined Solution Method: Bouwer-Rice

K = 13.4 ft/day y0 = 0.9968 ft



Data Set: \...\DMW32I SlugTest2.agt

Date: 09/10/10 Time: 10:49:33

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW32I - Test 2

Test Date: 8/3/2010

AQUIFER DATA

Saturated Thickness: 53.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW32I - Test 2)

Initial Displacement: 4.434 ft Static Water Column Height: 53.5 ft

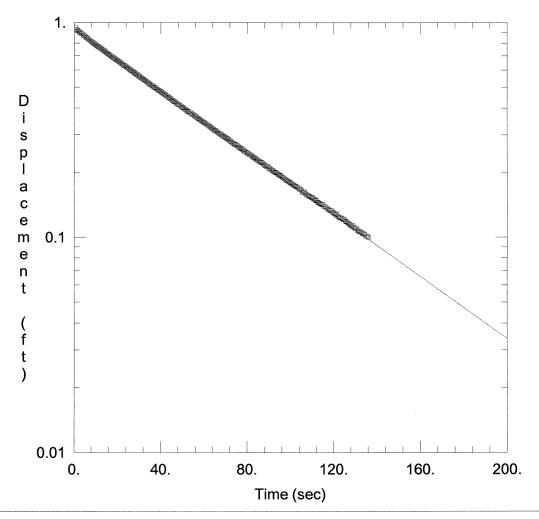
Total Well Penetration Depth: 49.5 ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aguifer Model: Confined Solution Method: Bouwer-Rice

K = 13.04 ft/day y0 = 0.9582 ft



Data Set: \...\DMW34I_SlugTest1.aqt

Date: 09/10/10 Time: 10:49:49

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW34I - Test 1

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 29. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW34I - Test 1)

Initial Displacement: 2.489 ft Static Water Column Height: 48.89 ft

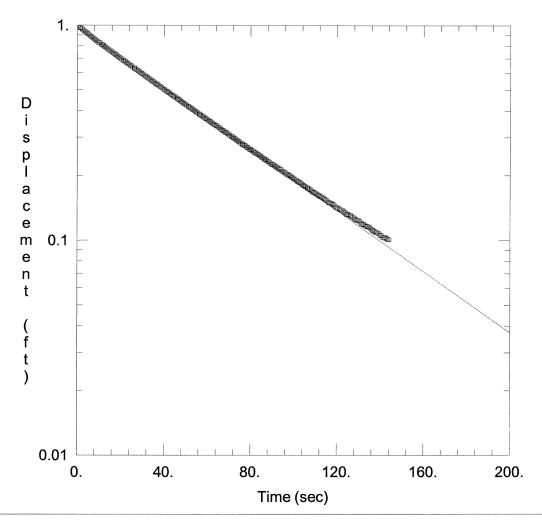
Total Well Penetration Depth: 27. ft Screen Length: 10. ft

Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aguifer Model: Confined Solution Method: Bouwer-Rice

K = 1.957 ft/day y0 = 0.9306 ft



Data Set: \...\DMW34I_SlugTest2.aqt

Date: 09/10/10 Time: 10:50:01

PROJECT INFORMATION

Company: Tetra Tech
Client: Lockheed Martin
Project: 112IC02902

Location: Martin State Airport-Dump Road

Test Well: DMW34I - Test 2

Test Date: 8/4/2010

AQUIFER DATA

Saturated Thickness: 29. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DMW34I - Test 2)

Initial Displacement: 2.668 ft Static Water Column Height: 48.89 ft

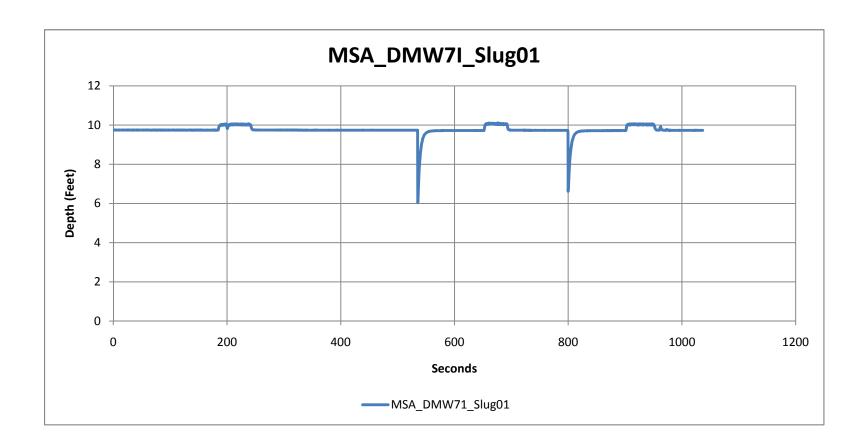
Total Well Penetration Depth: 27. ft Screen Length: 10. ft

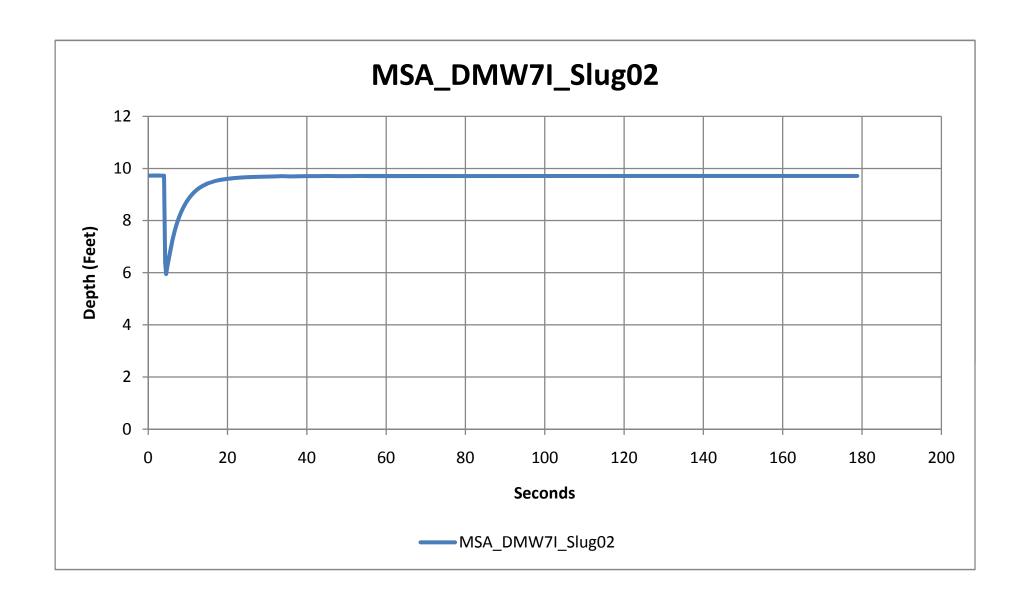
Casing Radius: 0.083 ft Well Radius: 0.083 ft

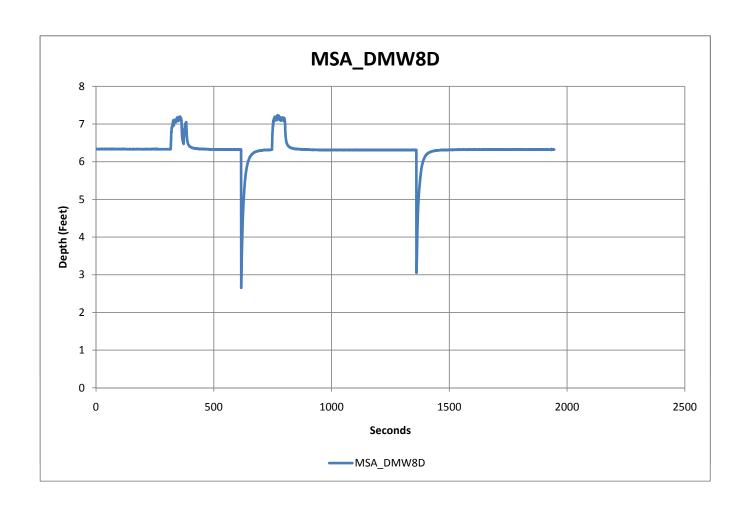
SOLUTION

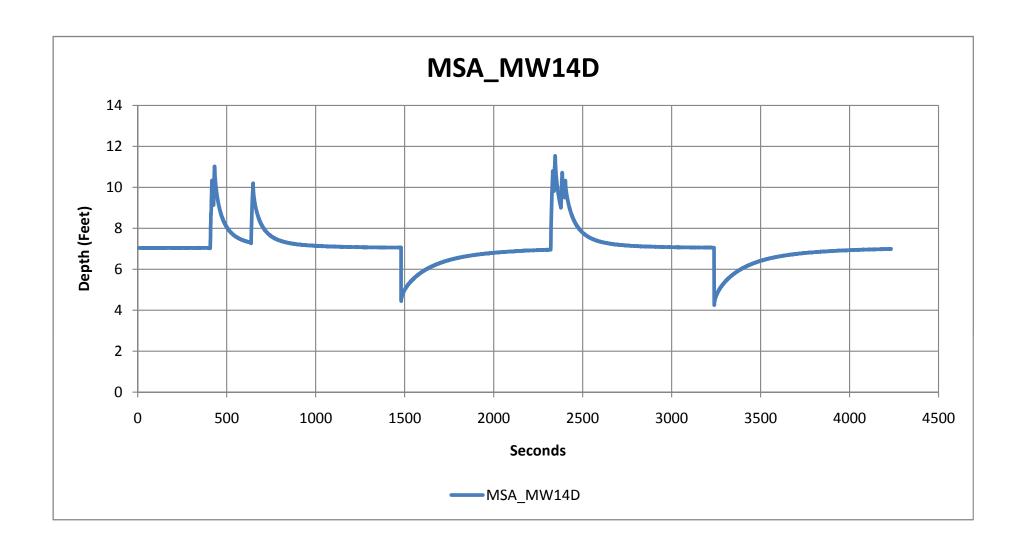
Aquifer Model: Confined Solution Method: Bouwer-Rice

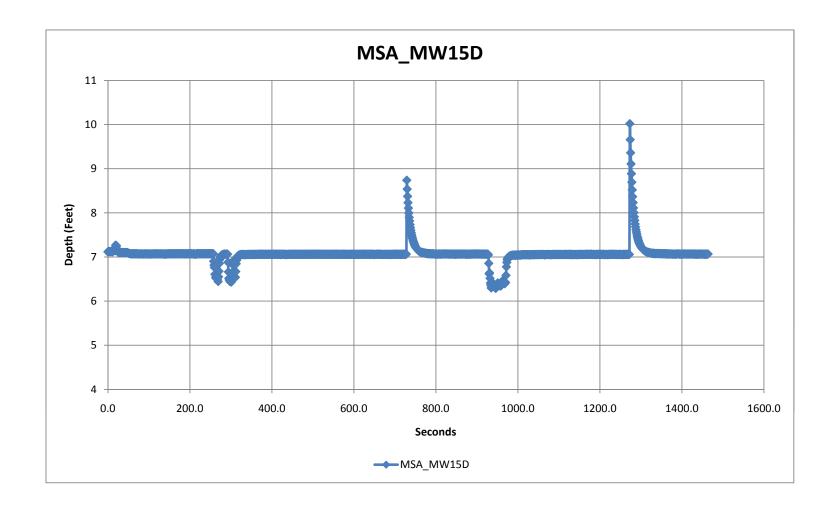
K = 1.931 ft/day y0 = 0.9772 ft

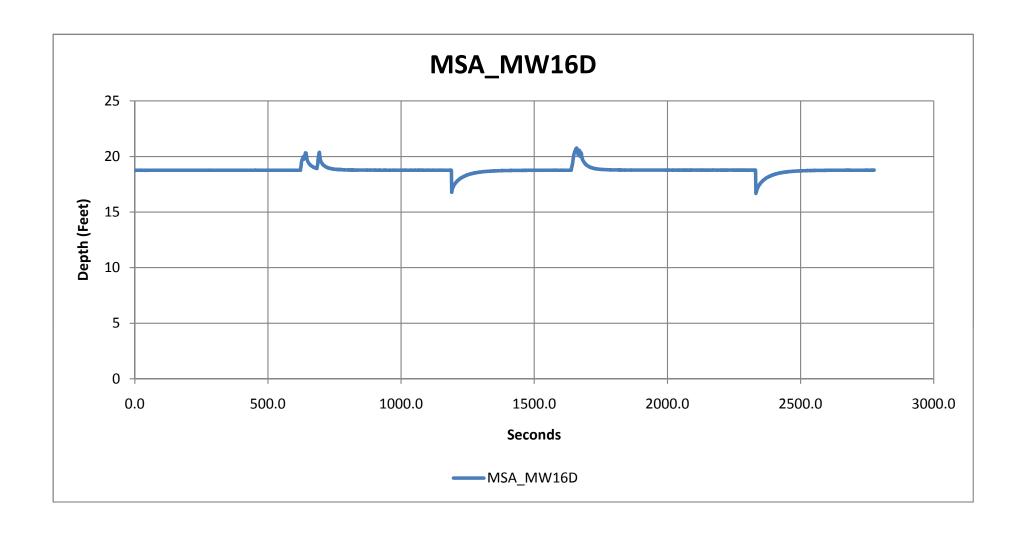


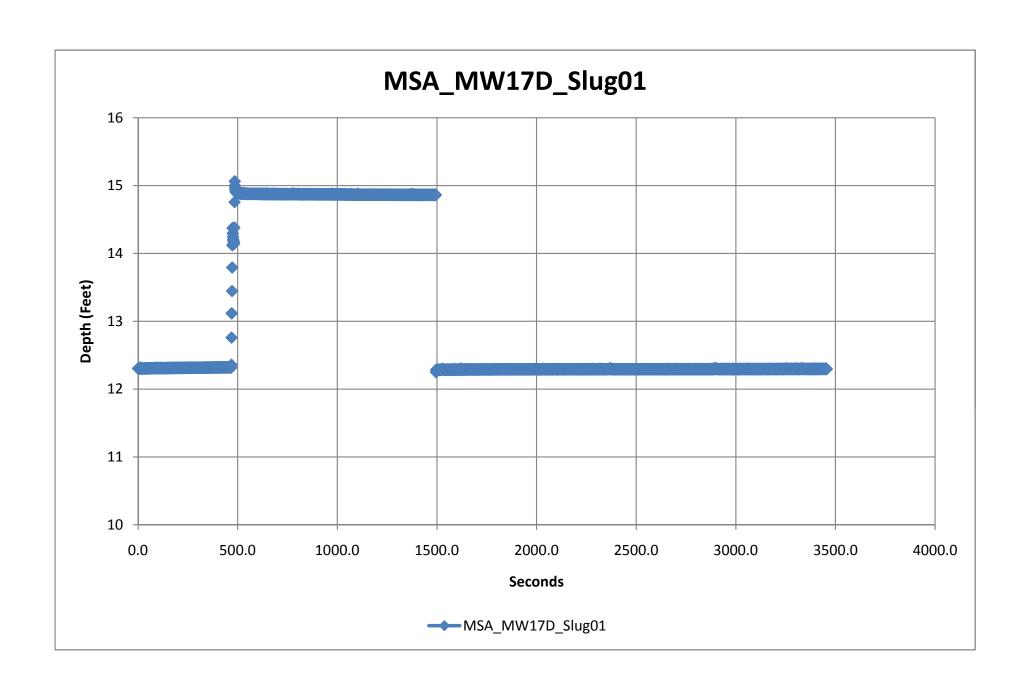


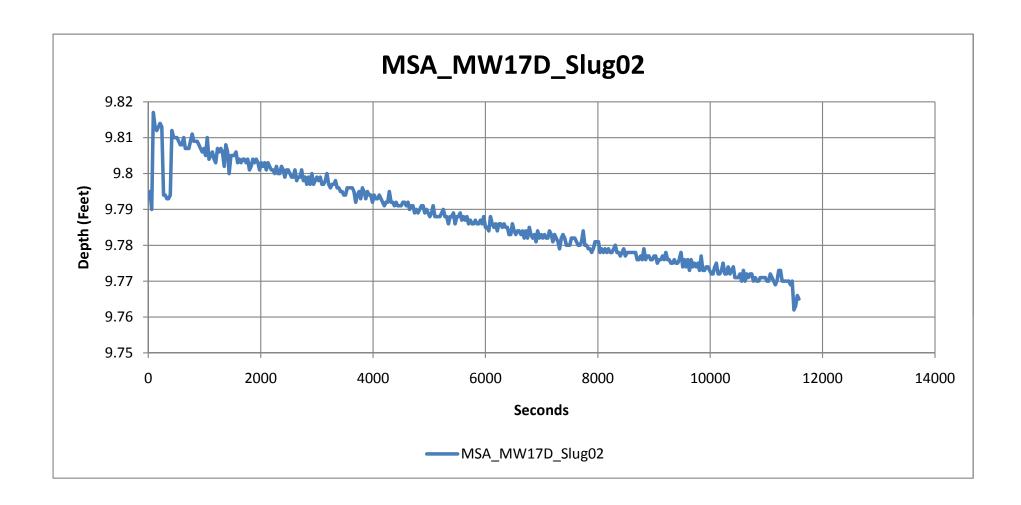


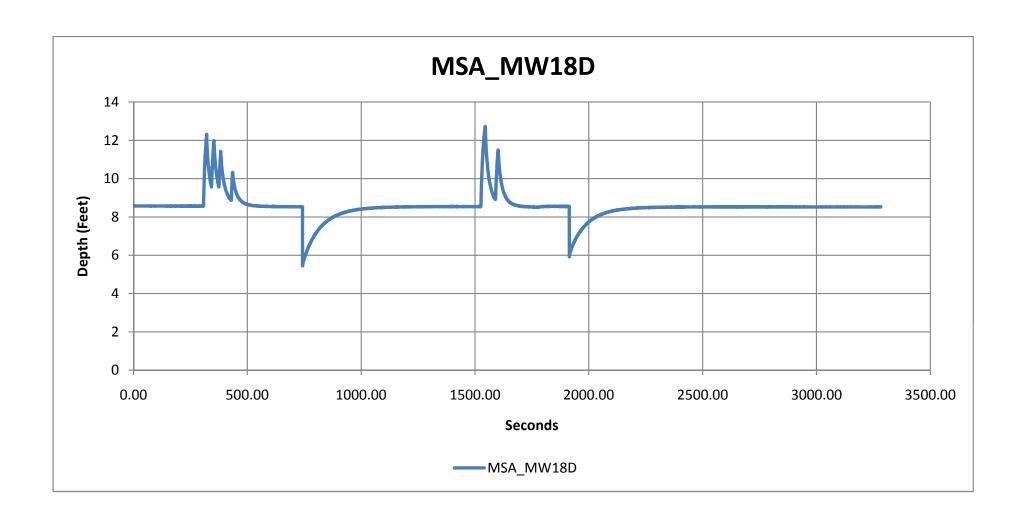


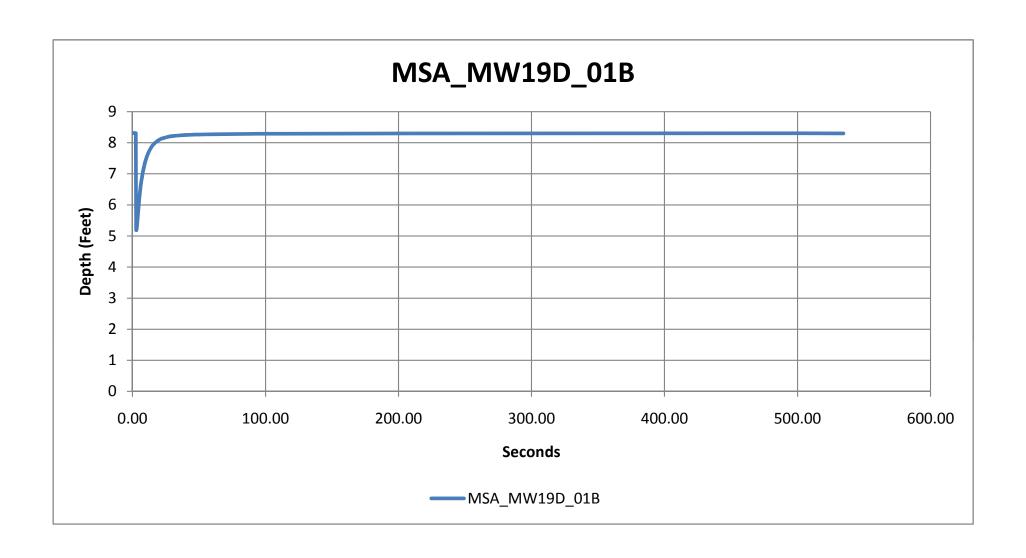


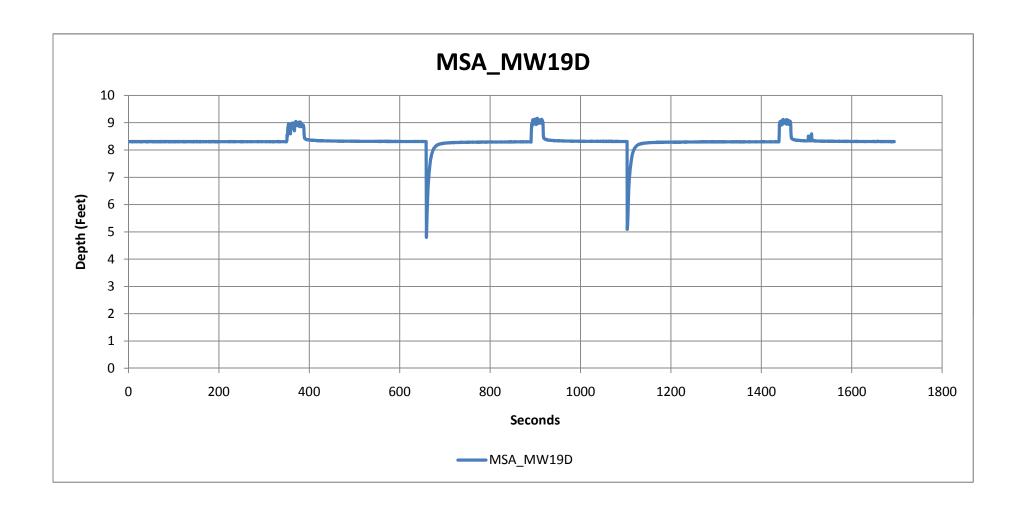


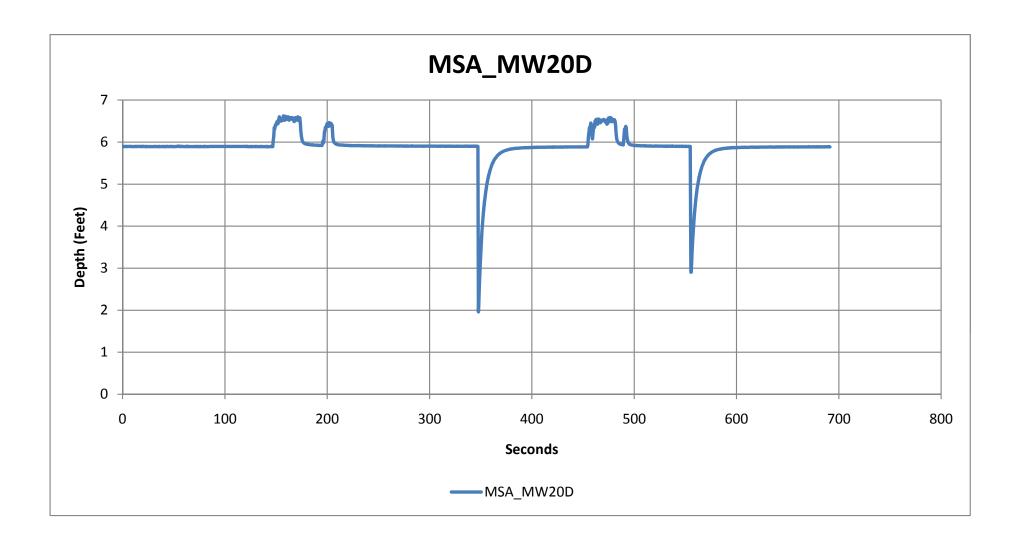


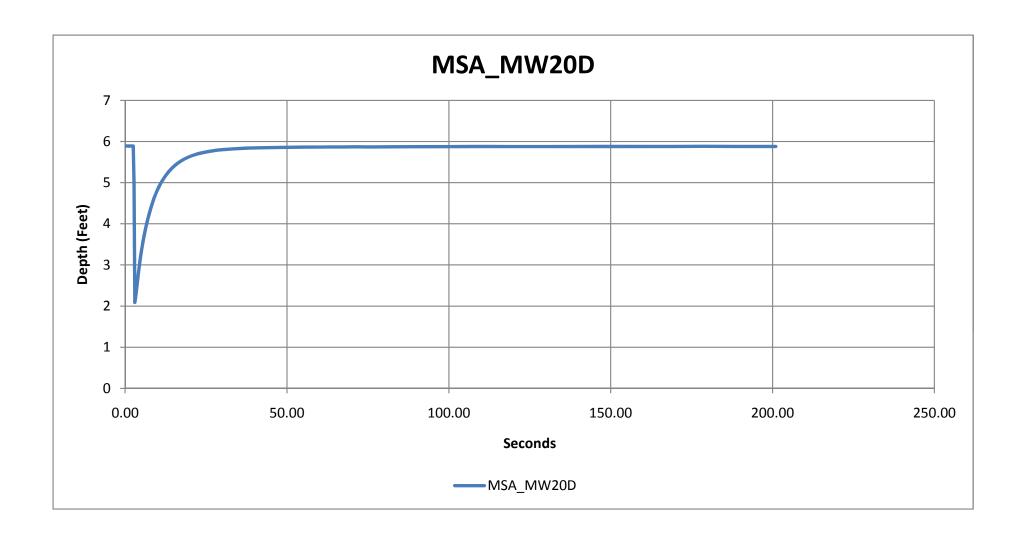


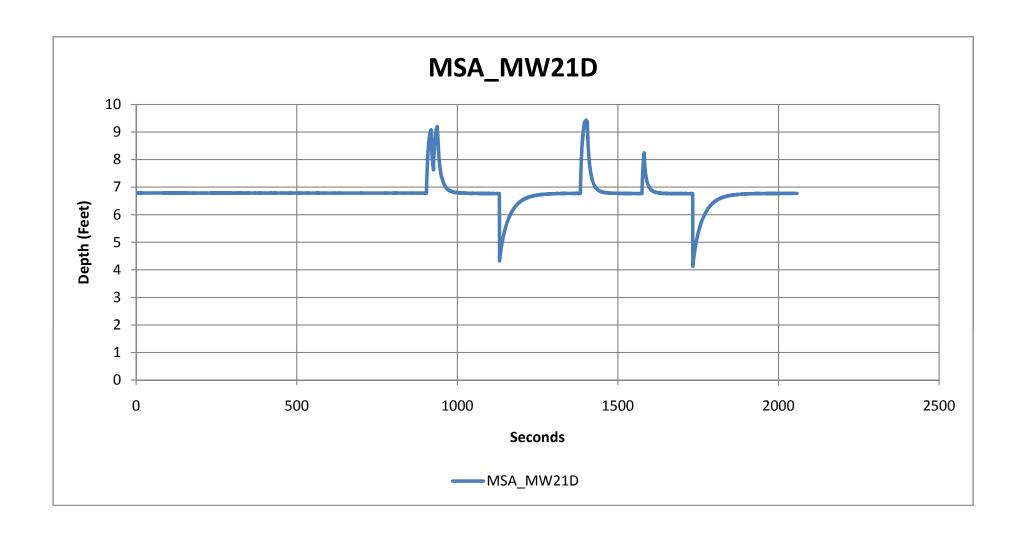


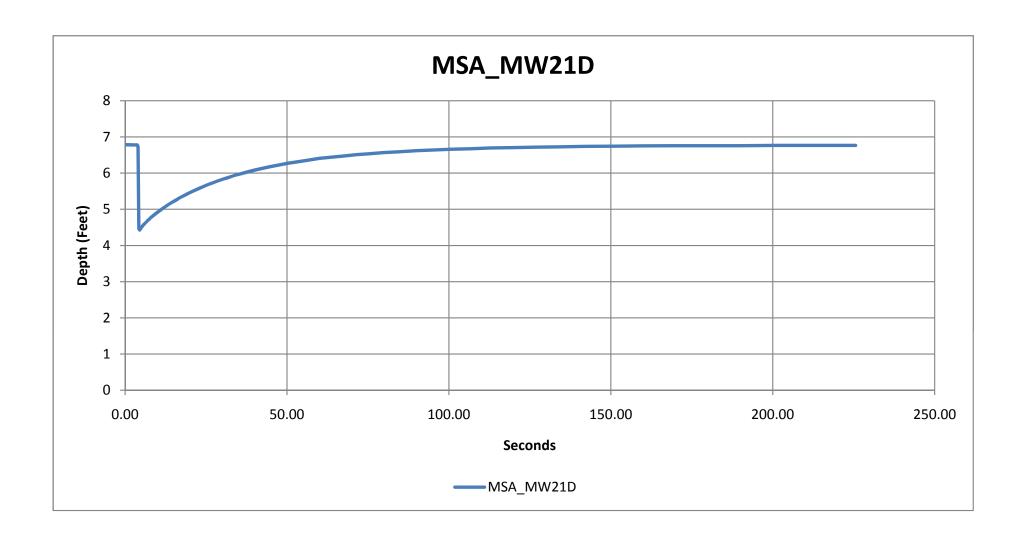


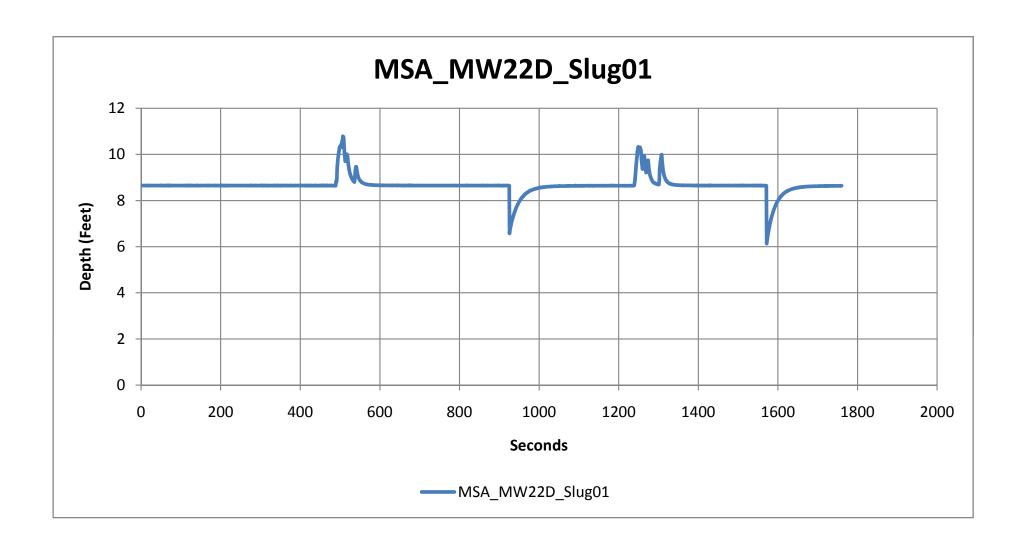


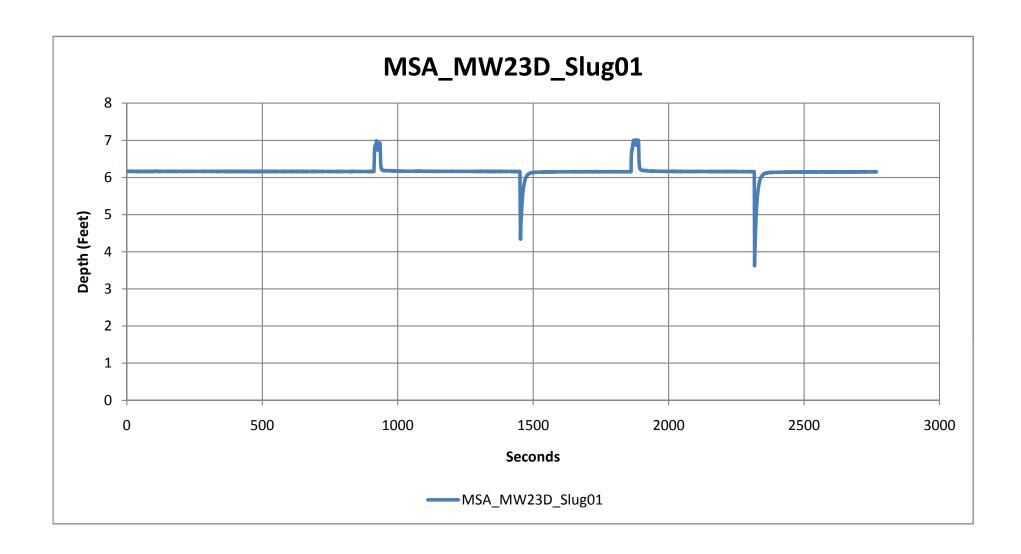


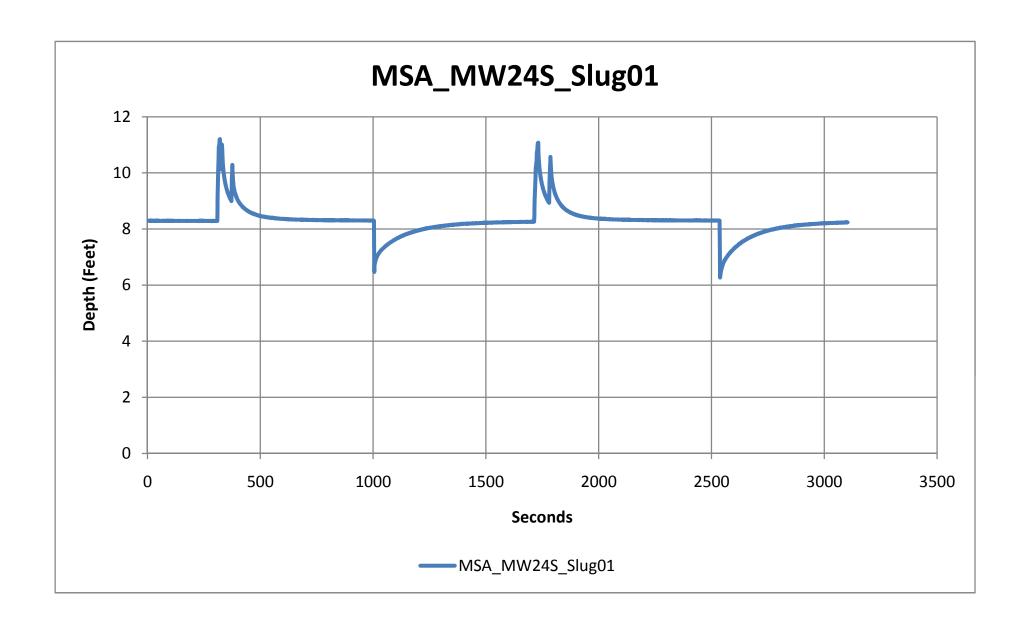


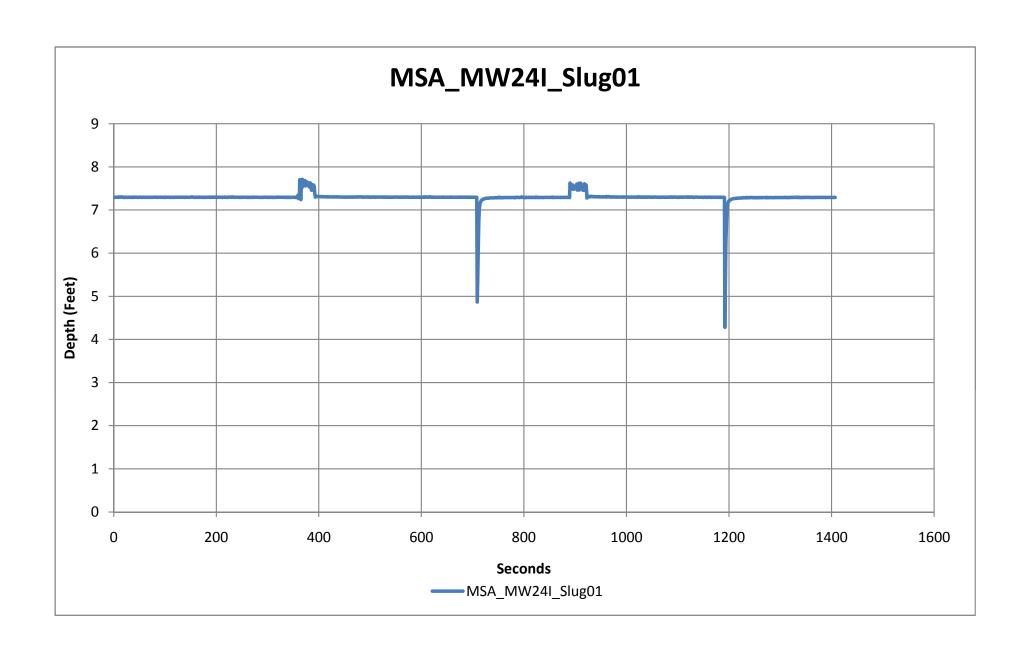


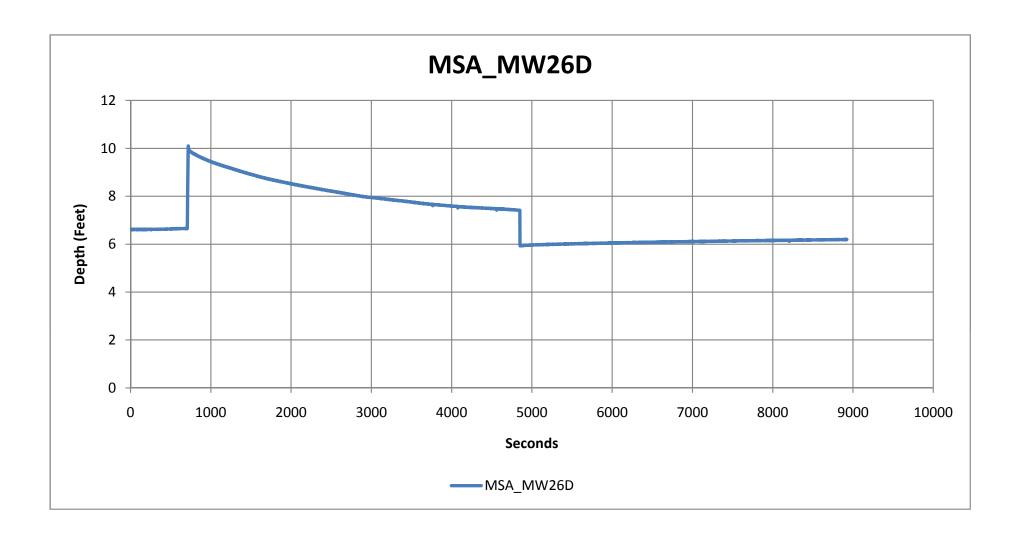


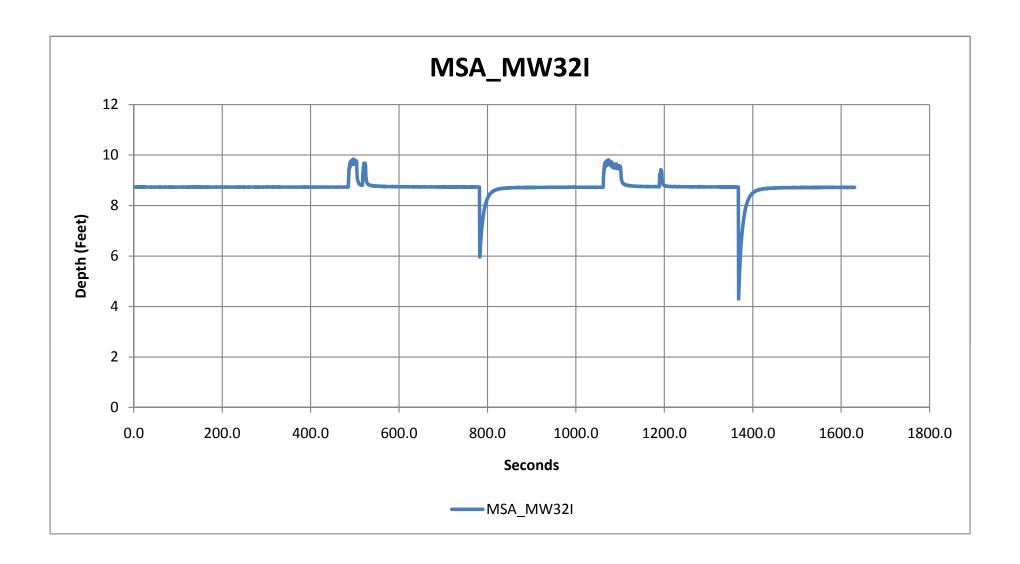


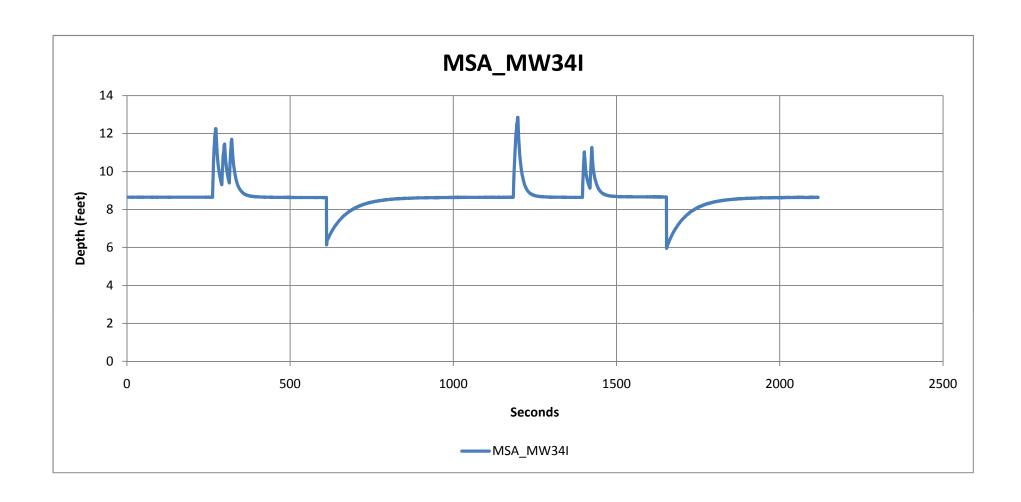






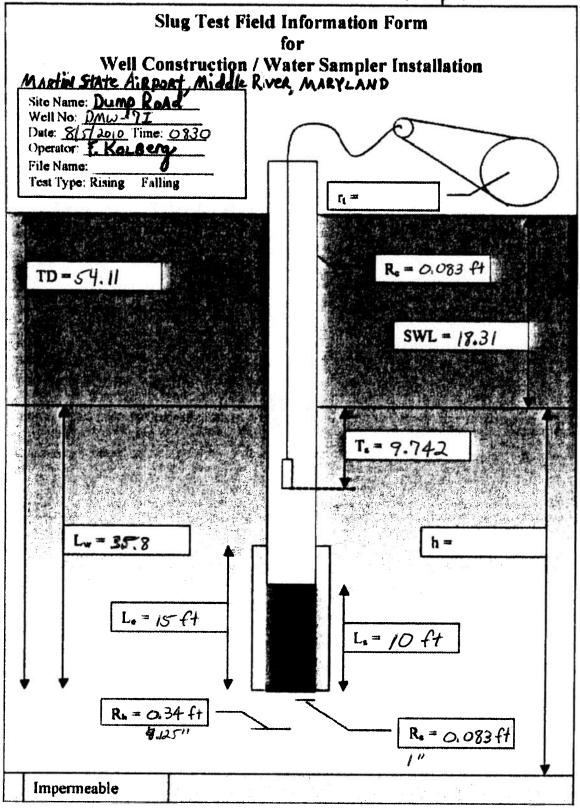




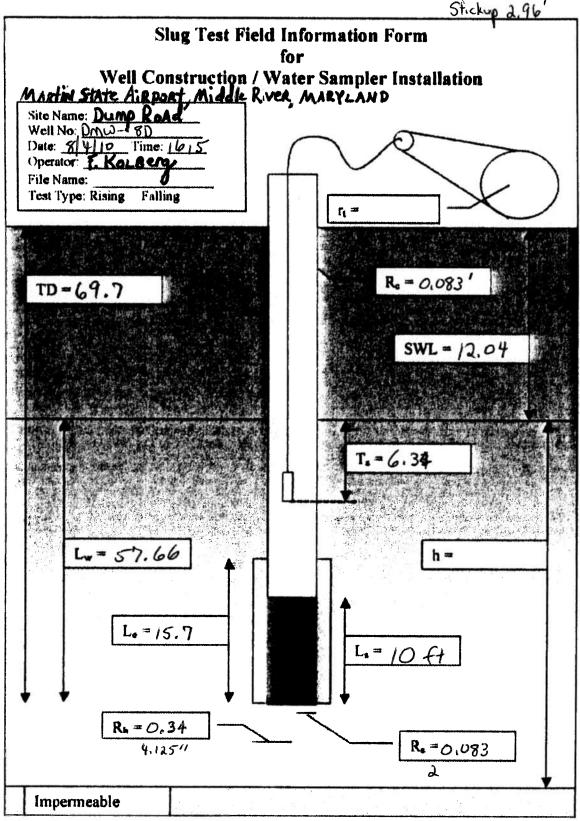


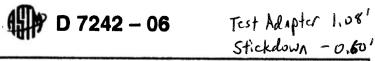
D 7242 - 06 Test Adapter 1.08'

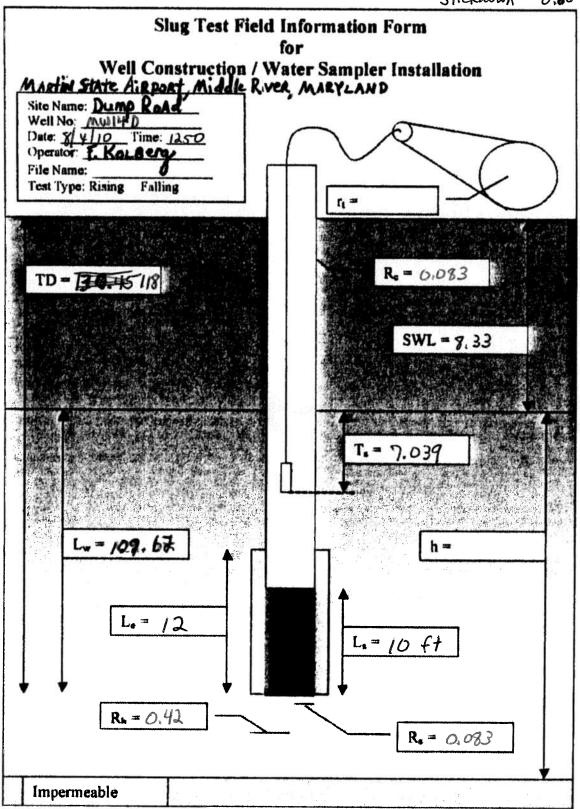
Sticky = 2.70'



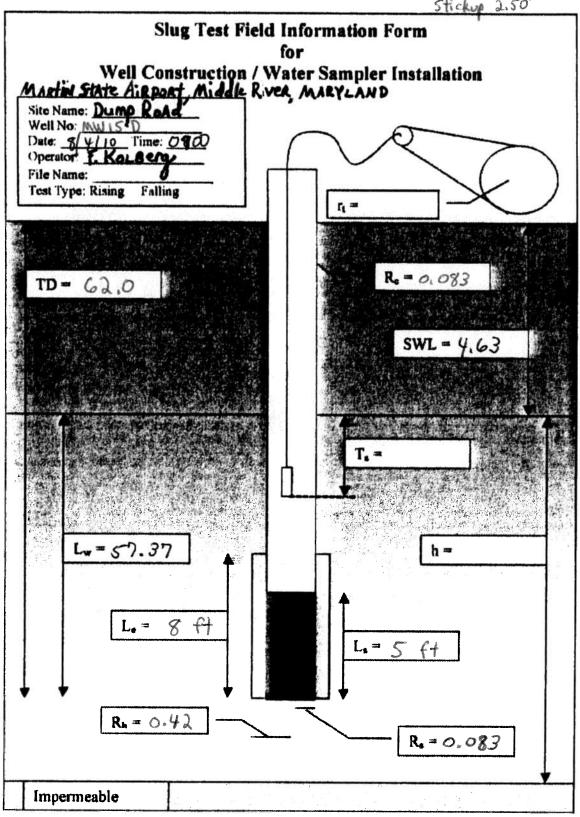
Test Adapter 1.08'
Stickup 2.96'

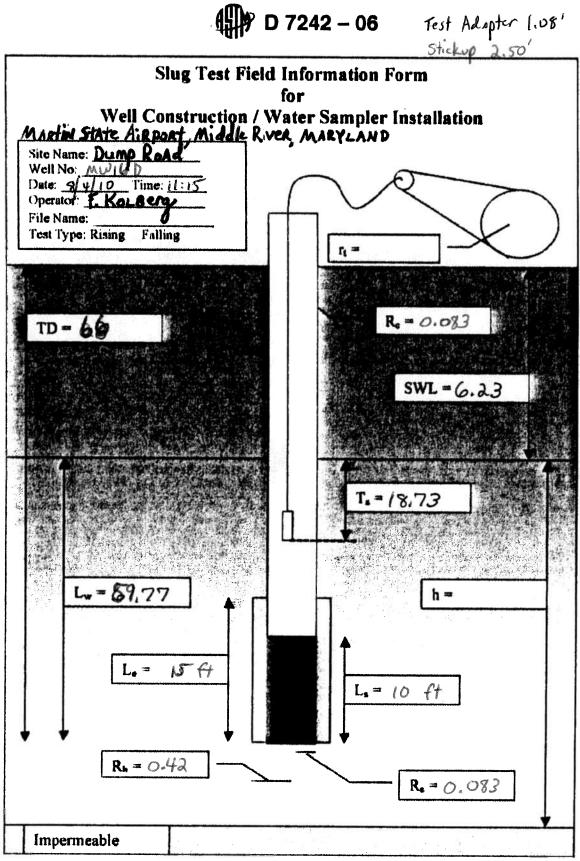




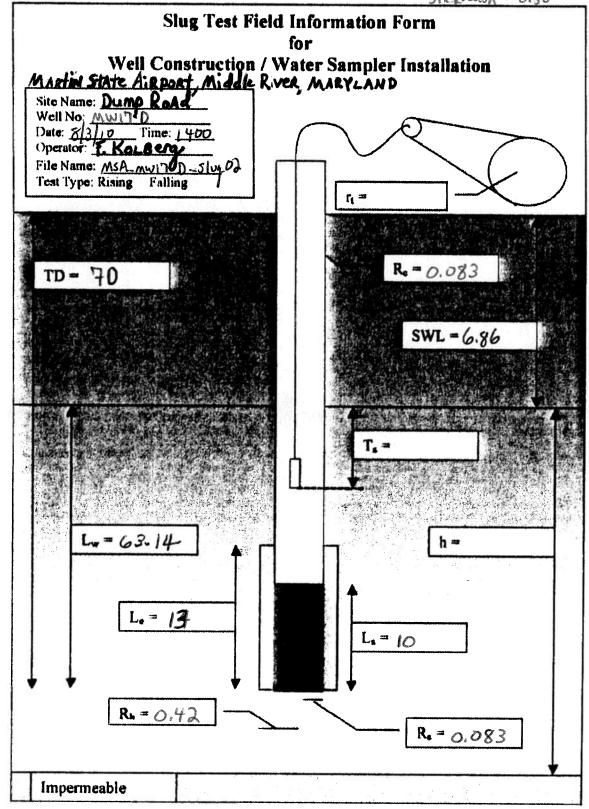


Test Adapter 1.08' Sticky 2.50'



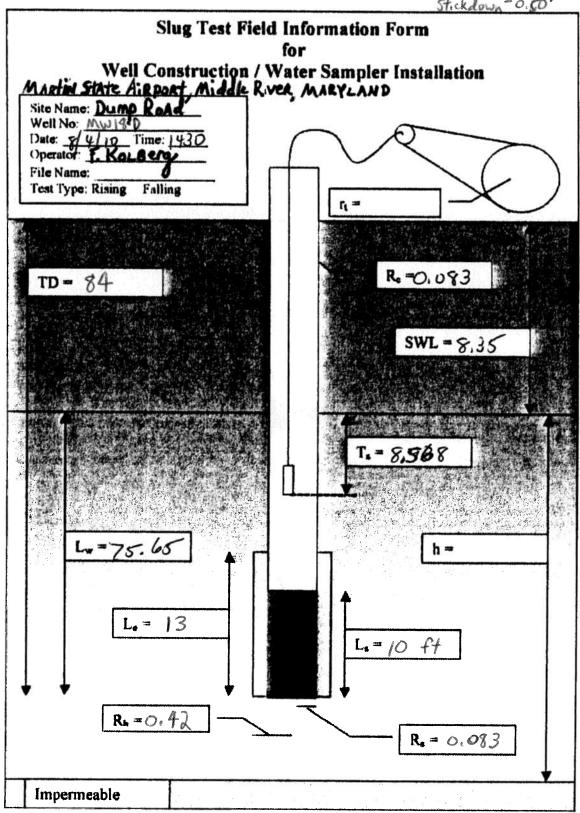


Test Alapter 1.08 only for stickdown - 0.50' pucumatic test



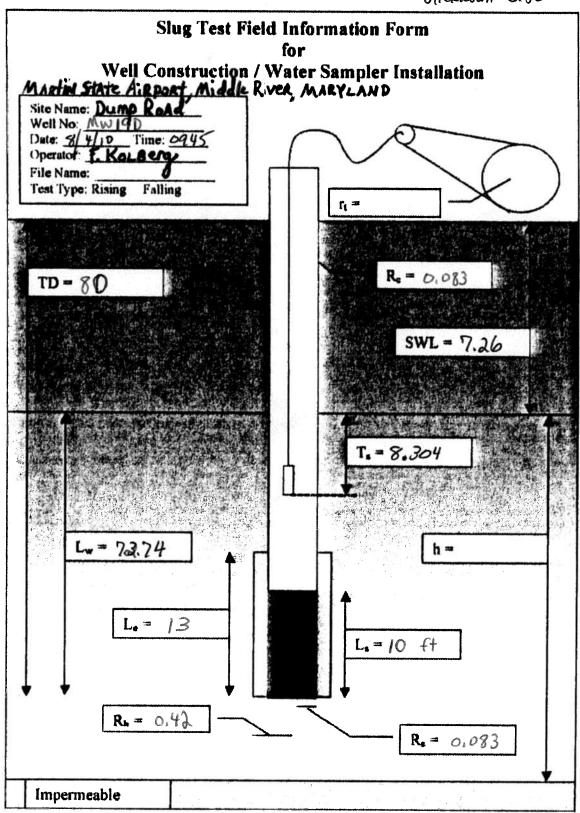


Test Adapter 1.08' Stickdown - 0.50'



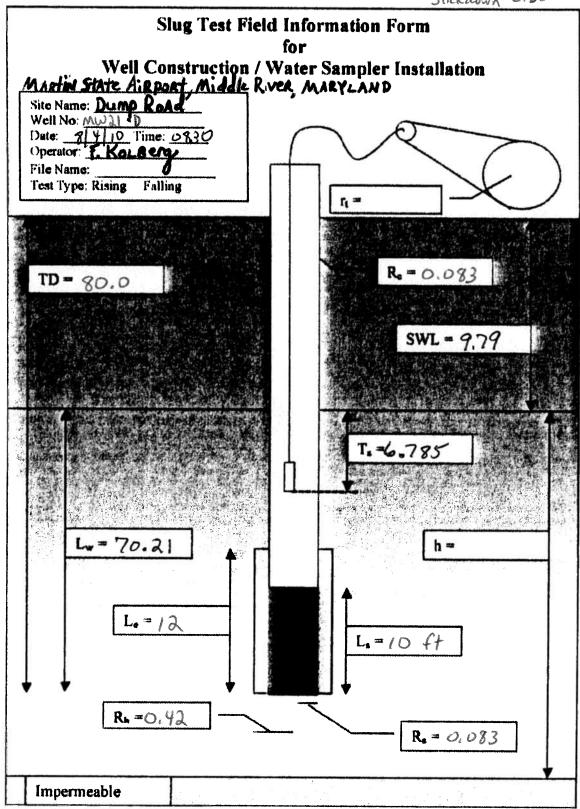


Test Alapter 1.08' Stickdown "0.50'

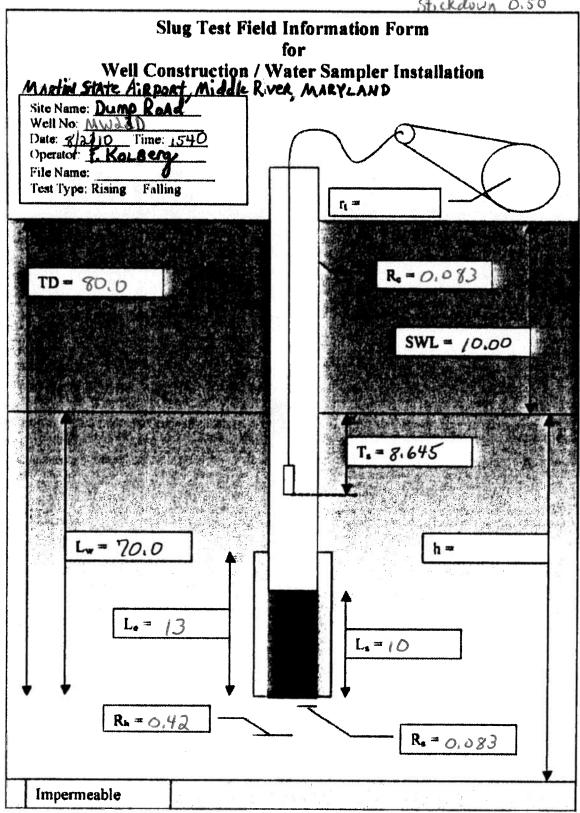




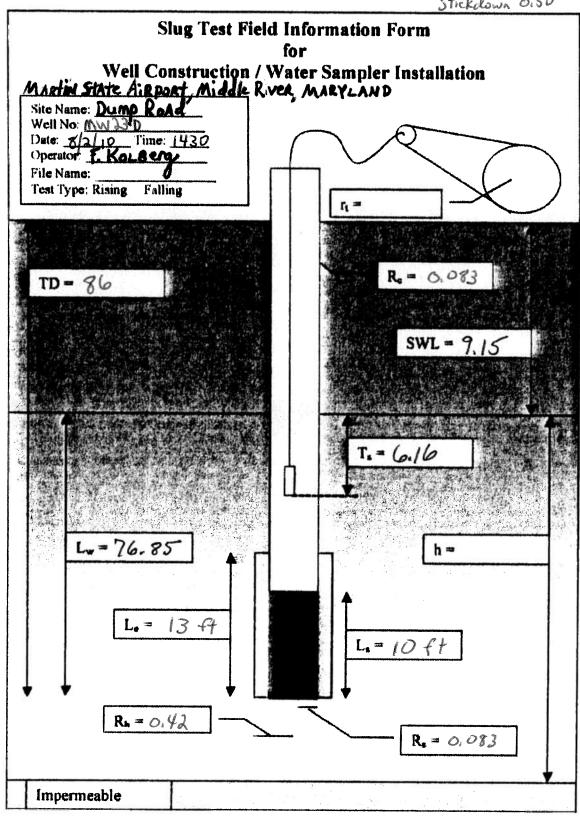
Test Alapter 1.08' Stickdown 0.50'



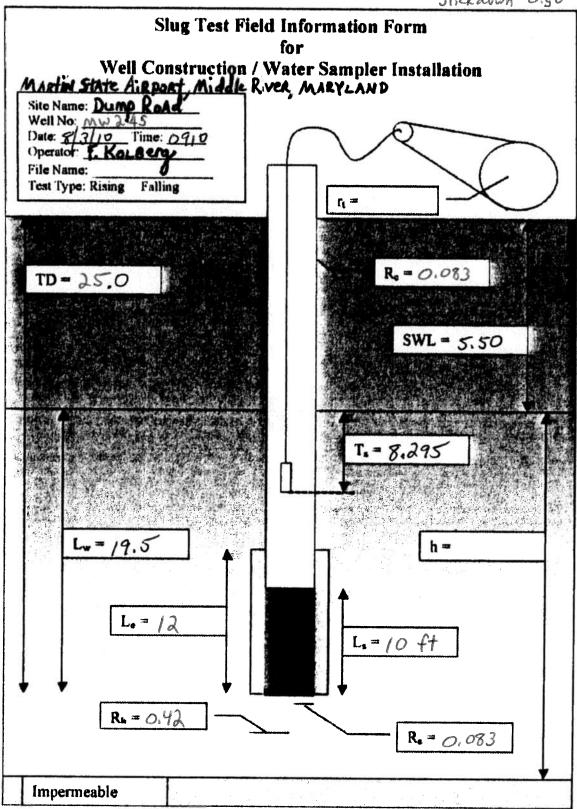
D 7242 - 06 Test Adapter 1.08'
Stickdown 0.50'



Test Adapter 1.08' Stickdown 0.50

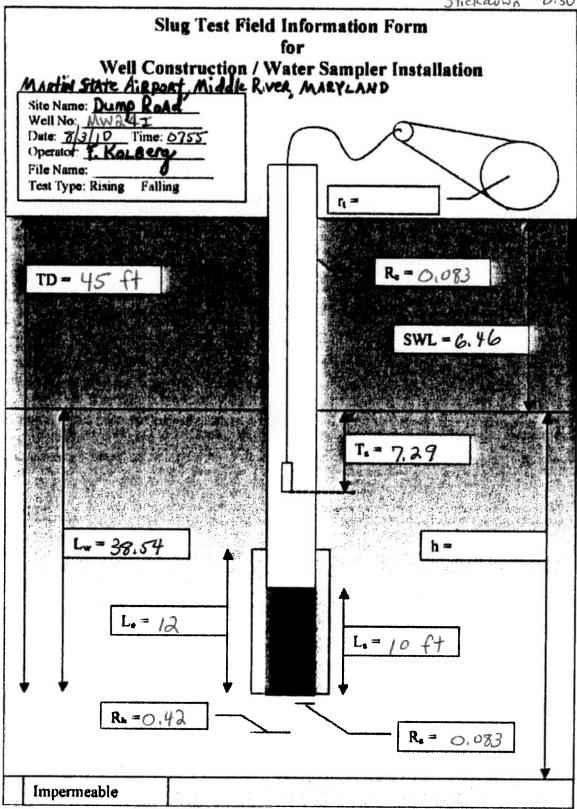


Test Adapter 1.08' Stickdown 0.50'

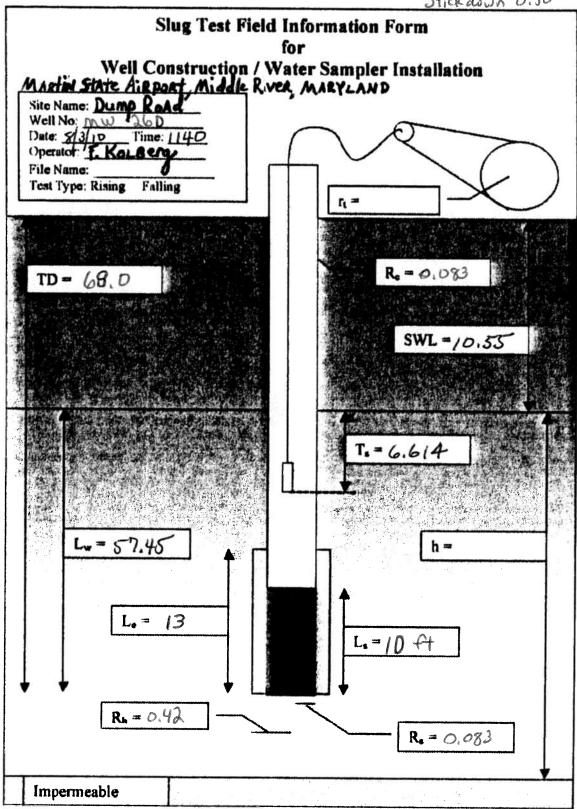


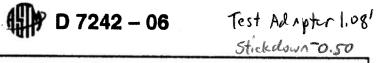
Test Adapter 1.081

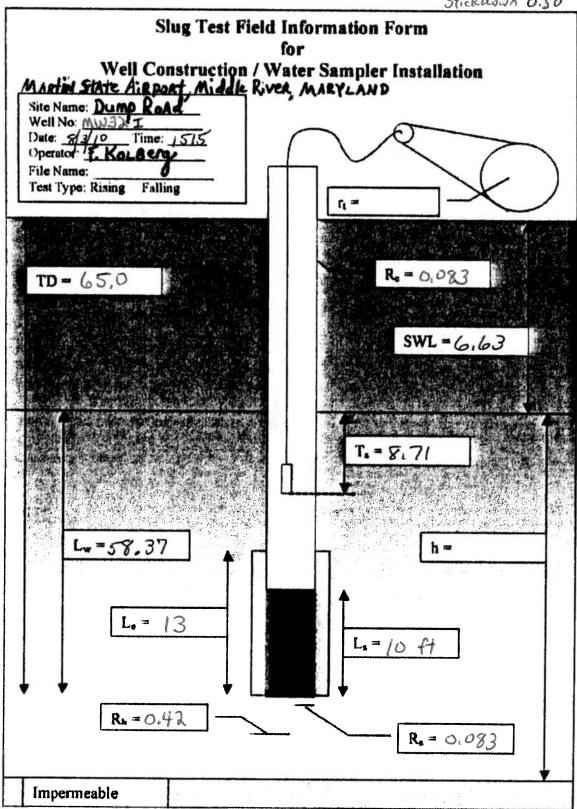
Stickdown -0.50'



D 7242 - 06 Test Adapter 1.08'
Stickdown 0.50

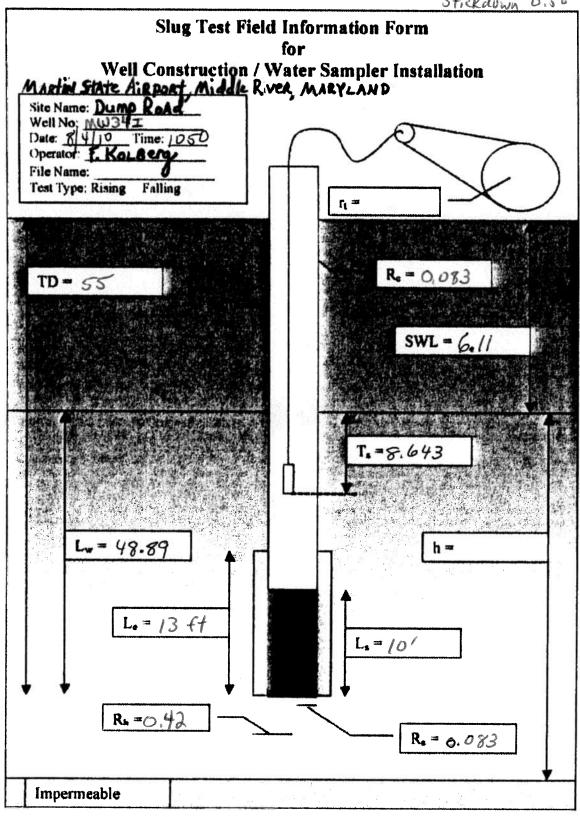






Test Adapter 1.08'

Stickdown 0.50





TETRA TECH BORING LOG BORING I.D. No. <u>DMW-7</u>

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CLIENT	•	L	ockheed l	Varti	in	T.C.	10825-10	LOCATION _	Martin State Airport	_ DATE	7/28/03
DRILL METHOD Sanic Rig					c Rig		AUGER DIAMETER	7 inches	_ FIELD GEOLOGIST _	Charles C.	. Laney III
DEPTH (leet)	WATER	BLOW	OVA (ppm)	SAMPLE	GRAPHIC	SOSN	GEOLOGIC DESCRIPTION				
			NA	III		SM	SILTY SAND - On	ange Brown, Silty	Sand, trace Clay, small si	zed Gravel, lo	ts of roots, dry
			NA			GP-SP	GRAVEL WITH S	AND - Gravel with	n Orange Brown fine grains	id Sand.	
3			NA NA NA			CL GP-SP	SILTY CLAY - Gra	ay, Silty Clay, har VEL - Gray, San	ndy Clay, 5% gravel, hard o d, dry. d with Gravel, < 5% Red Si		s, asphait
6				X							
			NA			CL	SILTY CLAY - Da	rk Gray, Silty Clay	y, 5% concrete debris, moi:	st.	
9 -							Same as above, c	olor change to De	ark Red, soft, moist.		
			NA				Same as above, c	olor change to De	ark Gray, wet, strong petrol	eum odor.	
							Same as above, fi	rm, plastic, moist			
12 -							Same as above, s	oft, plastic.			
15 -			NA	\parallel			Same as above, D	ark Gray, 5% me	tal fragments, plastic, soft,	wet.	
							moiet.	AND IN THE STATE OF THE STATE O	ark Gray/Mottled Orange Bo	rown, some Sa	andy Clay,
18							SANDY CLAY - O	range brown, Sar	ndy Clay, hard, firm, dry.		
							gravel.		ange Brown/Mottled Gray,	some Silty Cla	sy, < 5%
			NA.			SM	Same as above, co		ght Pink. ght Gray, Silty Sand, Gray	Clavienses n	naist.
21			NA.			CL		THE THE RESIDENCE OF THE PROPERTY OF THE PERSON OF THE PER			-100
			NA NA			SP CL	SAND - Light Purp	le to Orange Brow	oht Grey, Silty Clay, hard, som, medium grained Sand, ed, Silty Clay, some Silty S	wet.	ff, dry.
- 24 -											
REVIEWING GEOLOGIST CHARLES C. LAWEY TE SIGNATURE SICH C. LATE REG. NO.											



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CLIENT	r		ockheed	Marti	'n	T.C.	10825-10	LOCATION _	Martin State Airport	DATE 7/28/03
DAILL	MET								_ FIELD GEOLOGIST _	
DEPTH (feet)	WATER	BLOW	OVA (mpm)	SAMPLE	GRAPHIC	nscs		GEOU	OGIC DESCRIPTION	
. 27			156			SP	SAND - Very Light Same as above, Lig		Sand, 5% dark Red to Pur lay, dry.	ple Silty Clay lenses, moist
30 -			135			CL			range Brown/Mottled Light I grange Brown, Silty Clay, 59	
33 -			83.5 83.5			SP CL SM	SAND - Dark Purple SILTY CLAY - Light	e, medium Sand Gray, Sity Clay t Gray/Mottled C	ght Gray, hard, stiff, dry. , wet. v, plastic, soft, moist. Drange Brown, Sitty Sand, s	uiff, trace Clay, moist.
36 -			17.6	X	7///	CL			range Brown, Silty Clay, pla	astic, soft, dry.
- 39 -						SM SP	SILTY SAND - Light	t Gray/Mottled O	rrange Brown, Silty Sand, w	vet.
- 42 -			10.6			sw			o coarse Sand, moist. Light Gray Silty Clay lense	os, wet.
45	+	-					Shelby tube collecte	d from 45' to 47'	bgs.	*
- 48 -			9.6			sw	iensas.		kined Sand, wat, with 5% L	30 M WARRING
REVIEW	ING	GEOLOG	aist <u>c</u>	her	es C.(ANEY:	TI SIGNATURE	Anh C	EnTI	REG. NO.



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CLIENT	<u> </u>	L	ockheed l	Vlarti	n	T.C.	10825-10	LOCATION _	Martin State Airport	_ DATE7	7/28/03
DRILL	MET	нор		Soni	e Rig		AUGER DIAMETER	7 inches	_ FIELD GEOLOGIST _	Charles C. L.	aney III
DEPTH (feet)	WATER	BLOW	OVA (ppm)	SAMPLE	GRAPHIC COLUMN	nscs		GEOL	OGIC DESCRIPTION		v
	1						Same as above, s	ome Purple Huss			
- 51			6.9						ary Light Orange Brown.		
	$\left\ \cdot \right\ $		9				Same as above, s				
- 54			12.5				CAND Light Description		ing to very coarse grained	Cond with doub	- EN CIIN
	$\left\{ \left[\right] \right\}$		12.5				Clay lenses, wet. Same as above, s	is described as in		oano wiin depin,	< 5% July
57							Same as above, a				
						SM	SILTY SAND - Light Gray SAND - Light Gray sized gravel, satur	, coarse changin	nd, dry. g to very coarse grained S	and with depth, 5	5% large
60			4.9						um to coarse Sand, moist.		
							SAND - Dark Ora gravel, Dark Red s	nge Brown, coars stiff Sand lenses,	e changing to very coarse Gray Clay lenses, wet.	Sand with depth	, < 5%
- 63											
	$\ $			\parallel		CL	Shelby tube collec		, plestic, stiff, moist. " bgs.		
- 66				X							
	$\ \ $		3.0			SW	wet.	1-40-0070 UNA 15-5	changing to ocarse grained ty Sand, saturated.	d Sand with depti	n, < 5% Silt
- 69											
			4.1			sw	SAND - Light Brow lenses, < 5% Silty		ging to coarse Sand with d	epth, dark Red st	iff Sand
72							Same as above, se	aturated.			
							Same as above, m				
REVIEV	NING	GEOLO	GIST C	HAR	LEG C.	LANEY	I SIGNATURE	Such	CATT	REG. NO.	



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CLIENT	·		ockheed f	/arti	n	T.C.	10825-10	LOCATION _	Martin State Airport	_ DATE	7/28/03
ORILL	MET	HOD		Sonle	c Rig		AUGER DIAMETER	7 inches	_ FIELD GEOLOGIST _	Charles C	C. Laney III
DEPTH (feet)	WATER	BLOW	OVA (ppm)	SAMPLE	GRAPHIC	sosn		GEOU	OGIC DESCRIPTION		
- 75 -			2.8			SM		ry Light Brown, S	ery Light Brown, 5% gravel, ilty Sand with 5% medium	2000	: 5% dry stiff
78						sw	SAND - Very Light	t Brown, medium	to coarse Sand, < 5% Silt, ry Silty Sand lenses.	wet.	
			4.1				Same as above, c				
- 81 -							Same as above, c	olor change to Li	ght Orange Brown.		
- 84											
- 5	test ,	4.50	1.7				4.2%				
- 87							Same as above, w		•		
90						CL			frown, Silty Clay, firm, dry.		
50			1.5			sw			medium changing to coarse um Sand, < 5% Silt, moist.	s Sand with d	depth, wet.
93						CL.	SILTY CLAY - Ligi	ht Grzy/Mottled E	frown, Silty Clay, hard, dry.		
				\parallel			Same as above, o	olor change to Li	ght Gray, moist.		
96						SM	SILTY SAND - Lig	ht Brown/Mottled	Light Gray, Silty Sand, < 5	% Clay, stiff,	dry.
REVIEV	MIN	G GEOL	OGIST C	H42	LES C	LANE	YZZZ SIGNATURE	Clark	C. WIII	REG. N	10



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CLIENT	ENT Lockheed Martin			T.C.	10825-10	LOCATION _	Martin State Airport	_ DATE	7/28/03	
DRILL METHO	מכ	Sc	onic	Rig		AUGER DIAMETER	7 inches	_ FIELD GEOLOGIST _	Charles C	. Laney III
DEPTH (feet)	COUNT		SAMPLE	GRAPHIC COLUMN	USCS		GEOL	OGIC DESCRIPTION		
99			П	REBERR		Total Depth = 99.0	bgs. Boring con	verted to groundwater mor	itoring wells	DMW-7D and
						DMW-71, using 2"	diameter PVC ca	ısing.		
102 -										
105										
108 -										
111										
114										
117						·				
120										
123										
L	GEOLOGIS	т <u>с</u> н	HAR	LES (C. LAN	EYÆ SIGNATURE	Anh .	(Just	REG. N	O



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CLIENT	•					T.C.	10825-10	LOCATION _	Martin State Airport	DATE
DRILL I	MET	HOD		Soni	c Rig		AUGER DIAMETER	7 inches	FIELD GEOLOGIST _	Charles C. Laney III
DEPTH (feet)	WATER	BLOW	OVA (ppm)	SAMPLE	GRAPHIC	uscs		GEOL	OGIC DESCRIPTION	
			4.0 6.6			SP CL	Same as above, o	olor change to B	Sand, 5% gravel, roots, dry.	
3 -	$\ \ $		8.1			o.	5% gravel, moist. Same as above.	ange conversion	and Dair Brown, Sixy City,	CONCIDENT AND INCIDENT OF THE
	$\ \ $		5.1	$\parallel \parallel$			Same as above, o	olor change to G	iray/Mottled Orange Brown	
\vdash	$\ \ $		0.0	H			Same as above.			
6	11			III			Same as above, D	Dark Gray, plastic	, soft, moist, petroleum od	or.
			0.0	III		SM	SILTY SAND - On	ange Brown, Silt	y Sand, 5% Clay, wet.	
	1			III			Same as above, o		rown, saturated.	
9 .	1		0.0	III	////	CL	Wood, roots, orga SILTY CLAY - Day		y, plastic, soft, moiet.	
-	$\ $									
	11			III						
12	1		0.0			SP SM	SILTY SAND - On		own, very coarse Sand, sab led Light Gray, Silly Sand,	urated. 5% light Gray Clay lenses,
	11			III			stiff, dry.			
<u> </u>	1		0.0	III		Cr.	SILTY CLAY - Lig	ht Orange Brown	vMottled Light Gray, Silty C	Xay, hard, stiff, dry.
15			0.0	Ħ		SP CL	The state of the s		ay, very coarse Sand, 5% la Light Brown, Silty Clay, han	arge sized gravel, saturated. d, stiff, dry.
	$\ \ $			III						
18			0.0			SM CL	SILTY SAND - De SILTY CLAY - Ligi Sand layers, hard,	ht Gray/Moltled (ilty Sand, moist. Drange Brown, Silty Clay, ir	nterbeded with 1" thick Silty
			0.0			82	SAND - Light Gray	/Mottled Purple,	fine grained Sand, metal n	odules, moist.
21			0.0				SAND - Light Gray	/Mottled Orange	Brown, fine to medium Sa	nd, wet.
			0.0			CL	SILTY CLAY - Ligi	nt Gray/Mottled (Orange Brown, Silty Clay, p	iastic, stiff, dry.
24										4,145
REVIE	WING	G GEOL	OGIST C	HAR	LES C	LANE	Y III SIGNATURE	Chil	(. C. 20	REG. NO



Page 2 of 4

CLIENT		L	ockheed N	/artir	7	T.C.	10825-10	LOCATION _	Martin State Airport	_ DATE	7/30/03
DRILL	METH	100		Sonic	: Rig		AUGER DIAMETER	7 inches	FIELD GEOLOGIST _	Charles (C. Laney III
DEPTH (feet)	WATER	BLOW	OVA (ppm)	SAMPLE	GRAPHIC	uscs		GEOL	OGIC DESCRIPTION		
							Same as above, v	vet, with interbedo	ed layers of Silty Sand and	Clay, dry.	
27 -											
			0.0				Same as above, h	nard, dry.			
30 -			0.0			SP	<u>SAND</u> - Orange B	rown/Mottled Ligi	nt Brown, medium Sand, 59	% Silt, satura	ted.
		,	0.0			CL	<u>SILTY CLAY</u> - Lig Sand, dry, Purple		Orange Brown, Silty Clay, 5	% interbeded	I wet Silty
 	1		0.0			SP		_	je Brown, medium grained		
33						CL	SILTY CLAY - Lig Sand, Purple Hue		Orange Brown, Silty Clay, h	ard, dry, intel	ibeded wet Silty
	1						Same as above, I	nard, dry.			
	$\left\{ \ ight\}$:		\mathbb{H}	////		Shelby tube from	35' to 37' bgs, no	soil logging.		
36				\backslash							
		1				SP	SAND - Brown, co	parse Sand, wet.			
- 39			0.0			CL SP	_	-	Orange Brown, Silty Clay, s Orange Brown, coarse Sar		y Clay lenses,
******			0.0				<u>SAND</u> - Very Ligh	t Brown, coarse S	Sand, wet.		
42							Same as above, 5	% Dark Red stiff	Sand, saturated.		
							<u>SAND</u> - Orange B lenses.	rown/Mottled Ligh	nt Brown, coarse Sand, sat	u rated, 5% di	ry Gray Clay
45	4					sw	<u>SAND</u> - Very Ligh Clay lenses, quar		hanging to very coarse Sar	nd with depth	, 5% dry Gray
48							Same as above. o	olor change to O	range Brown/Mottled Light	Brown.	
							•	_	ght Brown/Mottled Orange		
REVIEV	NING	GEOLO	GIST	CHA	eues (C. LAN	EY III SIGNATURE	Conk (The Tit	REG. N	10



Page 3 of 4

CLIENT	Lockheed Martin	T.C.	10825-10	LOCATION	Martin State Airport	_ DATE _	7/30/03
DRILL METHOD	Sonic Rig	**	AUGER DIAMETER	7 inches	FIELD GEOLOGIST _	Charles C	C. Laney III
DEPTH (feet) WATER BLOW	OVA (ppm) SAMPLE GRAPHIC COLUMN	USCS		GEOL	OGIC DESCRIPTION		
- 51 -		cL	Same as above, s	aturated.	ark Orange Brown. Orange Brown, Sitty Clay, h soil logging.	eard, stiff, dry.	
63 -	0.0 0.0 0.0 0.0 0.0	SW SM SW CL SW	SiLTY SAND - Lig Same as above, L SAND - Light Gray SILTY CLAY - Light SAND - Very Light Same as above, co	ht Gray/Mottled light Gray/Mottled Orange at Gray/Mottled Crange at Gray/Mottled Co. Brown, medium polor change to verblor change to Li	urn to coarse grained Sand Purple, Silty Sand, saturate d Orange Brown, stiff, dry. Brown, medium Sand, wei Drange Brown, Silty Clay, h Sand, some Light Gray dry ery Light Brown/Mottled Lig ight Gray, wet.	t tard, dry. y Silty Clay le	nses, moist.
69 -	0.0	SM SW		iff, dry. aturated. / Mottled Light B plor change to Li	rown, medium Sand, wet, F ght Brown/ Mottled Light Gr	11.50	
REVIEWING GEO	OLOGIST CHARLES	SM C. LANE	SILTY SAND - Light		nd, wet.	REG. N	0



Page 4 of 4

REG. NO.

CLIENT		L	ockheed l	Marti	2	T.C.	10825-10	LOCATION _	Martin State Airport	DATE	7/30/03
DRILL	METHO	D		Sonk	Rig		AUGER DIAMETER	7 inches	_ FIELD GEOLOGIST _	Charles C	:. Laney III
DEPTH (feet)	WATER	COUNT	OVA (ppm)	SAMPLE	GRAPHIC	uscs		GEOL	OGIC DESCRIPTION		
- 75 - 78 - 81 - 84 - 87 - 90 -	WATER	COUNT	OVA 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	SAMPLE	GRAPHIC	CL SM SW SW SW	SILTY CLAY - Light SILTY SAND - Light SAND - Light Gray SILTY SAND - Light SAND - Light Gray SAND - Light Gray Same as above, se Same as above, we Same as above, tre Same as above, from 8	ght Gray/Mottled at Gray, Silty Clay at Orange/Mottled /Mottled Brown, if the Gray/Brown, 8 /Brown, medium aturated. st. ace Light Gray dr ose, moist. 5' to 90' bgs	Orange Brown, stiff, moist y, hard, dry. d Orange Brown, Sifty Sana medium Sand, 5% Silt, sati sitty Sand, large sized irons Sand, 5% Silt, saturated. Sand, < 5% Silt, stiff, wet.	d, atiff, moist. urated. tone, stiff, mo	pist.
							DMW-81, using 2° d	nameter PVC cas	sing.		
93 -											
- 96 -											
											# 0000000 L

REVIEWING GEOLOGIST CHARLES C. LANEY III SIGNATURE _______ SIGNATURE _______ SIGNATURE _______

	PRO	JECT:		LOCK	REMEDIAL (HEED MARTIN	INVESTIGATION MARTIN STATE		JOB NO. 112100444 DRILLING ME	WELL NUMBER MW14I and MW14D ETHOD:	CLIENT:	В	LOCI ETHESDA, M	(HEED MARTIN IARYLAND	İ		
	LOCA	TION:		В	ALTIMORE CO	OUNTY, MARY	LAND	COMPANY: OPERATOR: SAMPLING N	Prosonic "Bear"	FT. CONTINU	JOUS CORE		***************************************			~
WELL SCRE	EN:				JOUS 10 SLOT (0.01 INCH)								······································		
RISER: FILTER PAC	K;	2-INCH DIA. S #1 SAND	SCH. 40 PVC	SOLID C.	ASING			LOGGED BY:	: Graeme Bo 1: Refusal at 118 Feet bgs.	wles			····	START	DRILLING	FINISH
SEAL:		3/8" DIA. BEN						DATUM:	MD STATE NAD 1983 N/	L: 605129.8548	3 E/L: 1479550.682			DATE		DATE
GROUT:		PORTLAND 1	TYPE II CEME	ENT/BENT	ONITE (18:1 RA	TIO)	***************************************	PERMIT NO.	- BA-951-693					2/7/2007		2/23/2007
						***************************************		 						ł		
SAMPLE TYPE	DEРТН (%)	SAMPLE INTERVAL	RECOVERY (INCHES)	BLOW COUNT	MOISTURE CONTENT	PID READING (ppm)			CONDITIONS:	***************************************	GROUT BENTONITE SANDPACK	1	Uscs	H	WELL.	N
						 					SANDPACK		7	1		
ļ	•	ļ	<u> </u>				TIN YELL OF								Flush Moun	-
		†				0.0			RD SAND WITH SIL YR 6/6 WITH 10YR		AY, AND GRASS AND 2 MOTTLING	SM				
	2				DRY	0.0			DIUM HARD SAND					1		1
	6	0' - 10'				0.0 0.0 0.0	FINE ME	DIUM HAR	RD SAND 10YR 6/6 V N8 LENSES MO		AND A LITTLE CLAY	SM				
	8	1				0.0			HARD SI	LT		ML	12000			
CONTINUOUS 4 INCH DIAMETER CORES	10 12 14 16	10' - 20'				0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	FINE	MEDIUM I	HARD SAND WITH	SILT AND	SILT LENSES N8.	SM				
	18					0.0									1	機
IAN						0.0										100
무	20				MOIST	0.0										
8	22					0.0										
IS 4						0.0	FINE		HARD SAND 5Y 8/I MINATIONS WILL			SM				530
g	24	- 30'				0.0		LA	MINATIONS WILL	LITTLE CI	A1.					
Ĭ Ĕ	26	20'.				0.0										
Š	20	2				0.0										100
0	28					0.0			·····				-			
	30					0.0										
	.32					0.0										
						0.0	EDIE C	OFT CAND	5Y 8/1 WITH LITT	E OLAN	ND ON THOMBOU					
	34	- 40'				0.0	rmuss	OF I SAINE	MOTTLIN		IND SILT TOTA 6/0	SM				
	36	30.		l		0.0										
	38			ŀ		0.0									****	****
					WET	0.0										
	40					0.0		***************************************		***************************************						
	42			ľ		0.0										
		_				0.0	y assert -							565		
	44	- 30'				0.0					5Y 8/1 WITH CLAY ID LENSES 10Y 6/2.	ML/CL		188		
	46	20.				0.0										
	48]		0.0										
					MOIST	0.0	HARD	CLAY 5VP	3/2 WITH SHIT MO	TTI FC SV	4/4AND FINE SAND		erene en			
	50			-		0.0	יייייי	JANI JIK	LENSES		"THE SAIND	CL	200			
	52			ĺ		0.0										
	54	ا ج				0.0	HARD:		WITH CLAY 10YR CCASIONAL FINE S		4 MOTTLING AND	ML				
		' - 40'				0.0		O.	CASIONAL FINE S	VIND TEN	oro					
	56	30,				0.0										
	58					0.0										
	60		¥			0.0										
	6U			ļ		0.0	pp.w. ·- ·	nn **	NB (0 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	17/17mex	m 0// 13 m 0 m =====					
	62					0.0					TR 8/6 AND 8/2 5Y 8/1 10YR 8/6 AND 5R 4/6	SM				
	L	1		1					SIDI WI		JIX 7/0		**************************************	P. ROY LEWIS CO., LANSING	-	-

	PRO	JECT:		LOCK	REMEDIAL I	NVESTIGATION MARTIN STATE	AIRPORT	DB NO. 112100444 RILLING MET	WELL NUMBER MW14I and MW1 FHOD:		LIENT:	***	ВЕТН		HEED MARTIN ARYLAND	l	
	LOCA	TION:		В	ALTIMORE CO	IINTV MADVI		OMPANY: F			····				·····		
	2007			-	ALTIMONE GO	OHI I, MAINI		AMPLING ME		/ 10 FT. C	CONTINUOU	IS CORE					····
ELL SCREE	N:				UOUS 10 SLOT (0).01 INCH)										·····	
SER: .TER PACK	······································	2-INCH DIA. : #1 SAND	SCH. 40 PVC	SOLID C	ASING			OGGED BY:	Graeme Refusal at 118 Feet b	Bowles						START	ILLING FINISH
AL:		3/8" DIA. BEN	NTONITE PEL	LETS					MD STATE NAD 1983		5129.8548	E/L: 1479550.682				DATE	DATE
OUT:		PORTLAND 1	TYPE II CEME	NT/BENT	TONITE (18:1 RAT	rio)	PE	ERMIT NO E								2/7/2007	2/23/200
***************************************					······································	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,											
		T			T _	T 1							T			ļL	
SAMPLE TYPE	DEPTH (A)	SAMPLE INTERVAL	RECOVERY (INCHES)	BLOW COUNT "N"	MOISTURE CONTENT	PID READING (ppm)	SL	JRFACE CO	ONDITIONS:			GROUT BENTONITE SANDPACK		ι	uscs		WELL ALLATION
	64	i è	·			0.0						Books.	**********			ALC:	
ŀ		7 - 30'				0.0										1000	
l	66	75				0.0										The same	
	68					0.0									_		8 8
ŀ		1				0.0											
Ĺ	70		1			0.0							1				
SS	72					0.0											
8	74	1			11/17/25	0.0											
RC		- 40			WET	0.0											
CONTINUOUS 4 INCH DIAMETER CORES	76	30,				0.0							l				
A A	78	1				0.0							-				
豆			ļ			0.0	FINE HA	RD SAND	10YR 8/2 WITH		E TO NO	FINES, POOR	TA	SP			
Š	80					0.0			SORT	ED			l			13.5	
14.	82					0.0							ļ				
ä	-					0.0							ļ				
₹	84	20' - 30'				0.0										fit little	
ž [86	8		ĺ		0.0											
8						0.0											
	88					0.0											
-	90					-0.0											
	N. F. BE					0.0			O SILT WITH SA E HARD SAND V				-	ML SM	1 10 10 10		
L	92					0.0		LIMI	HARD SAND	WIIIIS	MLI TUK S	2/4	_	SIVI			
ſ	94	ò				0.0		HARD S	SILT 5Y 8/1 WIT	H FINE	ESAND 10	OR 5/4		ML			
)' - 40'				0.0	FINE HART	SAND 10	YR 8/6 WITH SI	II T MI	TTI ES AN	ND I AMINIAT	TONS		1000		題 題
L	96	30,				0.0	THE HARL	- SIMILI I	10R 5		a rando Mi	IN PUMITINA I	10113	SM			
	98					0.0											
ŀ	400					0.0	FINE HARI	D SAND I	OR 4/6 WITH LIT		LAY MO	TTLES 5Y8/1.	AND	SM			
	100					0.0			10YR	8/6							
	102					0.0			· · · · · · · · · · · · · · · · · · ·								8
ŀ	104	, i			MOIST	0.0	НА	ARD SILT	5Y 8/1 WITH FI	NE SAN	ND LENSI	ES 10R 4/6					
-		20' - 30'				0.0		44.1×-	OH TO DOWN TO	1 NO. 11	VD C2	ZTTY .					
	106	8				0.0		HARD	SILT WITH WA		ND GRAV	/EL					
ľ	108					0.0			IIAKD	- tr 1							
-				l		0.0								ML			
	110			l		0.0	****				******	vm a 1					
ľ	HA HA								ITTLE FINE SAN ITH LIGNITE AN								
-								14/ WI	THE PROPERTY WA	· D · FAIN	sandel.	1 OSHIKKU M	. 500.				
ľ	116	ω,				0.0			~~~								
-	118				WET	0.0	FINE HARD	SAND 10	OYR 6/2 WITH SI MOTTL		WITH 10	YR8/6 AND 10	0R4/6	SM			100
	170					0.0		E	ND OF BORING				-		100000000000000000000000000000000000000		CONTRACTOR CONTRACTOR

RO. RIL	JECT LING	NAME NUMI COMI RIG:	BER:			<u>-</u>	GEOLOGI DRILLER:		HW-15 11-07-00 THIS NICLSON ROCKEY	<i>-</i>				•
mple No. Ind pe or IQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	RIAL DESCRIPTION Material Classification	U 8 C 8 ·	Remarks	Sample Sample	Z	Borehole**	Driller BZ**	
	0			0-6"	Loose	Red Bro	Sitti w/Kosts silty	sac	(2.542 4/4 12)	00				מט נ
_	\perp			6-21	1008C	Red Dia	SITT W/sands Gran	Su	6.5 VA 44 5	00				w
	\perp		4	2-3	word	Bre	SAND w/c/ay silly 57	sc	6.54 4/6)	00				
		\angle	. ,	3-4	SOFT	30	CAY! organic stay of	Ce	(3,54R N4)	00				
	7	\angle		47	STIFF	Gray	CAV While sand som	M	Q. Syn Pot NG)	0.0				
	_			7-9		/	JAME AS ASOVE		a ay	٥٠٥				
			4	9-11	1		SAME AS About		PH	0.0				
			ib	11-13			JAME A) Abore		. 914	0.0				
			,	13-15	1		SAME AS ASONE		1 ary	0.0				
	17			15-17	7		SAME IT About		in.	or v				
	١			17-19	FICM	ITV	Clay FAT-clah	CH	wet (54, 7)	00				
			١	19-20	STIFF	CTV	Clay: w/ wo said son	MC		00				
			10	20.22	loose	Bylo	N. SANDiw/c/ay segm		1/2/11	00				
	Į.			223	Firm	Plak	SAND: W/clay	se	(54 VD	00				
	27			23-27	Line	PILL	SAW silk sand	Sm	15 18	ه، ن				
	,			27-29	Case	Polivk Cont	SAND: WET withle	50	(54e \$ 3	010				
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	\prod		7	31-35			JAME AS ASOLE	341	wot	0.0	\dashv	1	ヿ	
ŀ	37			35-3-2			SAME AS ABOUL		1	ر ان د	寸	\exists	┪	
T					/		SAME AS AGULE				7	7	7	
				37-38	Loax	200	SANDiwsitty clay	741	(21 El Such	Cus	寸	\exists	7	
1	\top			3R 40	Lax	O, w/c	SANDI VISITA day		15- (2/2)	0.0	\dashv	十	\dashv	
\top	7 1			40-41	TIEF	4	CI	al	7/1		\forall	\forall	7	
T	t 1			4-(1)	SACI	DINK	80/10: 1410	الما الحد	ST 5 3/2	73	\dashv	\dashv	\dashv	
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No _

Well I.D. #:

Converted to Well:

Yes

			Æ	Tetra	Tech N	NUS, Inc). <i>1</i>	BC	RING LO	<u>og</u>		Pag	ge 🔏	<u> </u>	of _	_Z
0		PRO DRIL	JECT LING	NAMI NUMI COMI RIG:	BER:	Box		eym		BORING N DATE: GEOLOGI DRILLER:		11-07-07				
								ATE	RIAL DESCRIP	PTION	Г		PID/FII	D Rea	ding (ppm)
		Sample No. and Type or RQD	(Ft.)	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened interval	Soil Density/ Consistency or Rock Hardness	Color	Material Cla	ssification	u s c s ·	Remarks	Sample	Sempler BZ	Borehole**	Driller BZ**
			467			14.5-47	Lost	BN	SAND: CH	ear Five	50	mois (5 ve 7/0)	00	П		
					Λ.				a. 54ND: 0		S	(540 Va)	0.0			
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				/		57-la	Couse	Rick	SAND . IN	to sand clay	SK	2.5 in 43	0.0			
				4		62-68	HARD	38	CLAY: IN	organ 2	cı	2.5 yr 4/4	acc	Ц		
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			de moni	tor readin		intervals 4) borehole. In		reading frequency if e	elevated reponse re	ad.	Drilling Background	g Ard (ppn	∋a າ):[ั	ی، ر	_
		Conv	erted	to We	ll:	Yes	1		No	Well I.D	. #:_					

PRO	JECT LING	NAME NUME COMF RIG:	BER:	Bont	Longye	سده:	DATE: GEOLOGIS DRILLER:		MW-16 10-11-07 Grus Nickson Rocknicy Par				
J111L	LIIVO	ma.			/50	ATE	RIAL DESCRIPTION	Τ) Read		
ample No. and ype or ROD	Depth (Ft.) or Run No.	Blowe / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soli Denzity/ Consistency or Rock Hardness	Color		U \$ C \$.	Remarks	Sample	Sampler BZ	Borehole**	Driller BZ**
	0 7			0-6" 6"-4"	Yery Very Louise	Вп 310	Silt fine and viltuish	54 55 34	1.5 m 94	9.c			
				4-5	TIFF	B _C	Sitting Clay	cı	Dry \$ (25/3)	0.0			
				5-65	SOFT		Clay : W/ Fine JANA	cl	mois Cosy	09			
	7			6.5-7. ₅	Loose	Gry United	SILT DAMO		(7.5 pg 92) 7.5 yr 40	00			
				75-9 9-9.5	Loose Loose	(***** DIL CTV	C 21 11 A 7 2 1 10 1 21 10 C 2 .	BN		00 6.0			
					Loose	5.5.5 S. 3.5.5.5 S. 3.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.		SC		0.0			
			70	12-13 13-14	Loose	SET LES	Clay: 13:17 were me		DANIO DAM	0.0 00			
	П			14-i s			SAND (554 N7)	5M	1 a saul	a٥			
	+			•		THE LOS	00 LT-300 (1.51 90)	SM S≪				\dashv	,
			, , , , , , , , , , , , , , , , , , ,	26 5 DA		50 Se	SAND wasty Chy	5 S S S M	(7.51. 44) Moist (7.51 14)	0-0 0-0	1	7	-
	13			22.5.25	STIFF	750	EN CAN' WRENGEN BN	GE SE	Sity clay DAMY	0.D	7	1	
	17 1			25-24 25-24	HARC	15 T.	CAY WI FAR SALLIN		Exal med	0.U	#	\dashv	-
When	rock co	oring, ente	or rock bro	745-303 keness.	JOHN STIFF	HO CT-G	of lay: wifere soul	CL	7.542 5/6	ao			

	LING	RIG:		Joyle's		IATE	DRILLER:	Γ-	Rochey Par	PID/FIC	Read	ding (ppn
ample No. and ype or ROD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	3 C S .	Remarks	Sample	Sampler BZ	Borehole**	Driller BZ**
	_			30.5-33	Cosse	CT 60	SAND I HE FING SAND	ž	7.54 570 sem	20			
		/		1.5%			CAY WI Fire and	ce.	(7.5/1 5/1)	0.0			
	_	/		34-35	Chisc	red	SAND : MISTER SAND	SIA	DAMP.	ου			
	1	/	Įυ	35-38			Jim Jui anAU	2M		οċ			L
	37	\angle		38-38	Lease	300	JAND: W/ 5:17 chy	δM	DAMP (5/4 FLA	00			_
_	,	/					JAND, W/ Five silty"	Sm	(7.54 5/0) DAME	5.0			L
_	_	/,			Lonse		SAND: WE'ME SITY	SM	2.54 54) DAMP	0.0	Ц		L
_	\perp	4	٠,		STIFIC			6	DAM (2.54 NS)	9.0	Ц		L
_	+	/	10			L U	SAND Fine surly	24	(2.5 ya 4/2) (25 ya ms	0.0	\dashv		L
_	_	/	1	V. Toronto			BOC AY : Wifine sand	01	2.315 231	0.0	Н		L
-	47	/		46-48		Çm	1	SU	2.54. NG) NOIST	20	Ц	_	_
	7	/		18-48-Ce		Gry	SAND: Fine Mist and	54	(2512 NS)	0 .0	Ц		L
	+	/	1	48.6 5ac	LOSSE	17.8	SAND WI FIRE SILY CLA	SH	mois 5 (7.54R N7)	0.0			_
	-	/	0	06-546	Loss	201-8	SAND wifine sin cly	on	montes Com	DιC	4	3.0	_
_	+		7		JIKF	47-R	Clay, wish she	ÇĹ	(25 yr NS) moids	000	_	_	_
_	57	/		554-57		ay"	Clay Trace or soul	Ø.	(2.5 ye N5) DAM	Ø-0	4	_	_
-	+	/		57-58	Lane	Gny	SAND : W/Clay seams	80	wist (25/1 Mg)	04	-	_	_
-	1	/		28-59	HARD	Gry	Clayings. IT or sand	CL	(25/ NO)	0.0	_		
_	+	/		59-61	STIFF	300	CAY: norried	·L	(2.5/4 MS) 2"	0.0	4		_
_	4	/		61-13	Lose.	34	SAND WISH	حد	(2.542 4/4) DOMP	64	4	_	_
	67	/		63-67	Hard	TYR	CAy: Wrive said	CY	2.542 45/ (25, 45)	6.0	4	_	_
_		/		67-68	Hard	Grry	Clay of oil Think	cl	25yr (26)	5.0	4		_
		/					techi la Ca		7 10	\Box	4		_
_		\angle				/	Ermina tool (a)	Ц	68	_	4	_	_
* includ		oring, ente			borehole. In	ncrease	reading frequency if elevated reponse re	ead.	Drillin Background				

) NAMI	=:	NUS, Inc	s. I Spok	BC	DRING LOG BORING N	10.:	Pag	je _	ntonieronia (of _	dentarramento
			NUMI COMI		Z.A			DATE: GEOLOGI	QT.	10-09-04 Gray Nillas	1			
			RIG:	AHL	SAVIC	Cook	+2	DRILLER:	J1.	Rocky PA				-
			T T				IATE	RIAL DESCRIPTION	Т			D Rea	ding (ppm)
	Sample No. and Type or RQD	(Ft.) or	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened interval		Color			Remarks	Sample	Sampler BZ	Borehole**	ļ
		O			0-6"	Lanc	BAK	Silt Fine sand six with	Su	(2.5 N3) 2mg	0.4	П		
		1			6-25		Con	Clay 5:14 said clay	CC	(2542 12 4/4	00	П		
					25-50	•	Gy.	Clay where und	2/	Dama	00	H		
					50-60	1	CVAY LT-B	Cla site a loda	6	(5:12 5/10)	0.0			
		7			6-7	10006	C	SAND WICK USITY.	<u>/</u>	5 (4)	22			
		Ţ				Coast	G21/2	SAW : sady class	80	254 9-1	90	П		
				1	1 . '	COOLE	GN	SAND: Fine of the son	Sin	Castratal)	2.3	П		
				10	1'	SUFF	30/	Clay; said silte et.	cc	(51K, 161) -	0.0	П		
					6.715		OK	Clay: w/ Fine souls	ci	11/4 Q.Sun44	00	П		
		17			15-17		Enster	Clay: and silt chy	cs	(2511 48)	00	П		
of rolan.		1			7-20		GAY	CAU WISHE AND	ec	(2.5 1/25) DANG	5.3	П		
The state of the s				N	20-12	11	Tel 1	al/	a		රා			
		27		Q_{r}	22-27	Hard	GrAY	Clavi. in Fine smil	M	(25/2 Dry)	30	П		
				7	27-29	Harrel	Gre	BrCAV. w/FAXE sad segme	cl		0,د	П		
					29-36	Hard	Gny	Clai where and			υò			
		37			36-37	- 11	۶	same a stone	CC	10-9-634	0.0			
					37-39	coope	CT-B1	SAND: w/chy seams.	٥Ċ	4.542 900T	0.0			
				7	39-42	LOSE	C7-31	SAND: 0:14 and	δc	cht Tope de vo)	0,0			
		(`	42-44	Cose	CT-DI	SAND Fine and My	3 C	(7.5 x 4/6) 000	ده			
		47			44-47	U	*	SAME AS MODE		peoist 1	0			
			\angle		47-48	Lux	Cong Tinv	SAND: 5: 14 Fine stand	Sc	w ctry som	20			
				Ò	48-49	Loode	BN	JAND: W/chy	ac	105 for 14	20			
		\perp	\angle	\	49-49.	Lust	Brgs	SAND : uj clai	تد	6.84x 360)	5 o			
		57			49.57	Hond	G14 67-R1	Clay Sprine smel	M	Gdor mout	کنة			
								/ '						
		de mon	oring, ente			borehole. In	ncrease	reading frequency if elevated reponse re	ead.	Drilling Background (٥, ٥	<u></u> ව
	Conv	erted	to We	II:	Yes	X	***************************************	No Well I.D	. #:					
					,									_

RO RIL	JECT LING	NAME NUME COME RIG:	3ER: 1	Dort)	Long	rke Yer	DATE: GEOLOGIS DRILLER:		Ma. 17 10-10-02 Gru Nolse- Rodny Par				
mple No. and pe or RQD	(Ft.) or	Blows / 6" or RGD (%)	Sample Recovery / Sample Length	(Depth/Ft.) or Screened interval	Soil Density/ Consistency or Rock Hardness	Color		U S C S ·	Remarks	Semple admission of the semple	Sampler BZ	Borehole** Bull	Driller BZ**
			10	57 6	STIFF	Rugt Bywe Zai			2.5 1 70 DAMP	00			
	67			65-6	MUST - STIFF	Gry	Clay Time sand	01	(Sur) " Damp	00		\dashv	
***************************************	W 1		41	67-71	Siff	Fro	Cony SAND: W/Ch	5c	2/	0.0 0.0		\dashv	
			İ			7	/						
		\angle				1		7/	(
		\leftarrow				10	Commented &	/			\blacksquare	_	
		$\overline{}$									\dashv	\dashv	\dashv
												1	
												7	
		\angle											
		$\langle \ \ \ \ \rangle$									_	_	4
		$\langle \cdot \rangle$									\dashv	\dashv	\dashv
											\dashv	\dashv	\dashv
											十	十	7
								_					_
				ŀ							4	\dashv	4
								_		\dashv	+	+	\dashv
-				ŀ				\dashv		\dashv	+	+	\dashv
								\dashv		\dashv	\dagger	\dagger	1
										\exists		T	1
clud			g in 6 foot	intervals @	borehole. In		reading frequency if elevated reponse re	ad.	Drilling Background (g Ard ppn	ea 1):[0.6	

Tetra Tech NUS, Inc	TŁ	Tetra	Tech	NUS,	Inc.
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	t	Tetra	Tech N	NUS, Inc).	BC	RING LOG		Pag	je ∠	(of _	<u>_</u>
PRO	JECT	NAME	BER:	<u>Marki</u> Bar 1	State	A	BORING N DATE: GEOLOGIS		10-15-02				
		RIG:	- MINT.	<u> با مهن در</u> ساک	ic 150	<u>64</u>	DRILLER:	J1.	CAUS NELSON Rochey Parr				
						IATE	RIAL DESCRIPTION	Γ		PID/FIC) Rea	ding (ppm
Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened interval	Soli Density/ Consistency or Rock Hardness	Color	Material Classification	U 8 C 8 .	Remarks	Sample	Sampler BZ	Borehole**	Driller BZ**
	0			0-6"	Love	はてるか	SiTT. whiley almy	MA	511 4K3	0.0			
	١						wkento		,				
		\mathbb{Z}		6-1	Case	BU	Sittiw/ sand med grown	30	Gravel 158	ه.د			
		/		1			CONCrete / Tree Part		(All)	ں.ی			
				1-15		<u> </u>	Tree Roots		Highly organic	100			
		\angle	P	15-20	Lane	Red	SAND. J. Hy sand	311	DAMO (5/4)	0.0			
		/		þ-3	LUSC	Bri	SAND, S. 14 W/n-darand		DAM D(SYNSY	b . c			
		4				<u> </u>	toots						
		/		3-6	80FT	3%	Clay , i Five sand	CC	(5 4 3/1) War	0.0			
	ත	$ \angle $		6-8	SOFT	ET.	SANCE AS Above	e(DAMP	0.0			
		/		8-10	SOFT	BN	Clay w Fire south	U	540 3/) wist	0.0		_	
	4	4		10-11		1	LANCE Roots			0.0			
		\angle	0	11-12		30	CAY: WITTALE OF MA	CL	· now (5423)	00			
		/	1	12-14	٠,	.,'	same its above	ध		0.0			
	18	\angle		M-18	ι,		SAne As Abone	ثر	Ca 4/	0.0			
	1	4		18-20	SOFT	कृष्	Clay: 51th clay	CC	- 54x 3/1 MOIST			_	
		\angle		20-21		8%	Clay: silty clay	GC	w/ gravely 5%	نا. ہ			
		\angle	VO	21-22	30016	Cry	SAND : w/c/n/ som	در	(5.54h) Moid	0.0			
	ı	\angle	\	22.25	SOFT	Gy	Clay: Usherm	C۷	2.5 yr 75	0.0			
	28			25-28	ξ,	\J. 1	Same of Ason	c((* '1	۵,			
	1	\angle		28-31	STIFF	ary	Clay, withing said	c((2542 5/2) PAR	p ,0			
		\leq	Ś	31-33	STIFF	Ped-F	sa Clay wolfing sand	ک	marbled same	0.0			
		\angle	10	33-37	STIFF	Bio	CAU. WE'ME SANGE	C	0 Am (35 4)	0.0			
	38			37-38	HARD	CY	Clack Marblerl	M	- Drug	5.0			
						Ţ	J		1				
	de mon	_	er rock bro		borehole. II	ncrease	reading frequency if elevated reponse re	ad.	Drillin Background			ی:	3
Conv	erted	to We	II:	Yes	\prec		No Well I.D	. #:					

BORING LOG

Page _Zof _Z

					N	IATE	RIAL DESCRIPTION			PID/FII	D Res	ding (ppi
mple No. and pe or IQD	Depth (Ft.) or Run No.	Blows / 8" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened interval	Soli Density/ Consistency or Rock Hardness	Color	Material Classification	U	Remarks	Sample	Sampler BZ	Borehole**	Deiller 87**
	ì		3.3	38-39	Hard	34	Clay under	u	Dane	0.0			
				•	ومحيج	_		Su	642 7D	0,0			
	48			1 .		5	C/Au: w/ TRACE Fine	\mathcal{C}	sand EVA 71.)	0.0			
	A	//		1	coase	To	SAND ENE JITE SH	lsu	(65 VA (40)	0. 、			
		/	1	1	371 FF	Y.T.	01.	d(clas (540 7/1)	0.0			
			U	52-54	Cosé	Gry	JANE I STREET IS THE	SM	DAMO	ں د			
	58	/	,	54-58	Į (ر در	SAME AS About	u	ic y	ں د			
					Cose		SAND graded sand	50	(542 6/6) DAM	ارين			L
			(62-13	Losse	800	SAND, WITRON DEPOSIT	SM	2.540 44 MOIST	0.0			L
							SANO w/silty chy	Sc		0.0			_
	Į,	,	10	64-65	UTIFF	Call	Clar wifin soul	α	(25/0XX) (25/2 M)	(U)			L
\bot	a							SC	Dame	0.0	Ш		Ĺ
	4			68.70	Coose	EW.	SANDI (5/2 5/0)	ړو	w/0:17,clay	00	Ц		L
4		4	2	70-70	lase	30	SAND WITH DEDNIT!	M	(7.54 /4)	0.0	Ш		_
			10	705-72	100sE	310		گc	(5/K 5/6)	0,0			ļ
4	\perp		,	72-73	10036	CT-C	m JAND: MO. 5T Mclay	œ	(54 T)	5.9			
4				4		a est	Clay: ilty Can	CL.		20			
4	78				Case			٦٢	(2.5 12 40) NG	5.4	Щ		
4				78-80	Denoi-	Gry	SAND WI CHAIR	\mathcal{L}	25/2 4/6 (25/2)	ð. 0	Ц	_	
4		\angle		80-87	STIFF	(24)	C'Acr N/7rack of	OL	D. Aul 7:54 96	0.0	Щ		
_		-					/		,		Ц	_	
_		-				16	mancel (a)		07-	igspace	\dashv	_	
4		<							9 .	\vdash	_	_	
\dashv		<			Redr	11ec	Boring went	45	o 24.6		\dashv	\dashv	
							(Deep well)			Ш			
nciuc			er rock bro g in 6 foo		borehole. II	ncrease	reading frequency if elevated reponse re	ad.	Drillin Background				

DRIL	LING	NUME COMF RIG:			104 /s	,	DATE: GEOLOGIS DRILLER:	o.: ST:	10-19-07- 1945 Notes Podney PA	PID/FIC	\ Saa	diani	
Bample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	RIAL DESCRIPTION Material Classification	J & C & .	Remarks	Sample	Sampler BZ	Borehole**	Driller BZ**
	0			0-6"	Cuse	BU	SITT: TOPROIL GIPS MUST	Щ	(10/4 4/2) DAMP	00			
	7			6-3	Love	3.0	5:11 (OU 4/2)	MC	DAMO	00			L
		\angle		B-45	FirM	3%	Clay (10/2 4)	cc	Plasticity went	00			L
		/,	·	4.5-55	STIFF	3%	Clay 10/2 3/1	<u>cc</u>	· Dunb	00			L
	4	/_		55-65	STIFF	Bro	SAND w/c/ay 100 5	SC	i (0.0			Ļ
	\perp	/,		65-7	STIFF	cony	Clay! WIFINE 1047,	SC	7.5 gr 7.5 yr	0.0			Ļ
	1	\angle	100	7-9	STIFF	LT-13	Clay: w band	SC	7.5 /R 17.5 /R	00			Ļ
	-	<	10	9-12	STIFF	BO	SAND W/ClAy	SC	- 540 16 Just	0,0			┞
		/		1	W. STIFF	INK	SANDi (Sya 12) May	٥٢	MOIST	þ.O			┞
	17	/	<u> </u>	3	Lower	PM	SAM) wish	Sm	(5yr 8/2)	2.0			┝
	+	\leftarrow		1	Cose	LT-1	SAME AS ABOVE	Se	MOSOT	0.40			┝
				1. /	Coox	74	(SAND w/clay	X.	(7.5 yr NB)	p.0	-		┞
		\leftarrow		1	STIFF	T-C)	CLAY . WIFINE SAND	C	, ic "DAMP	0.0			┞
		\leftarrow	9	145-215		17-6	CAY - WI KING SAND	cc	7.542 3/3 MOST	6,0	1 1		┞
	4-		\	31.5-23.		Cry	PINIC C JUND, 30/ MIR	S.	DANG	٧٥			_
	4-	\leftarrow		7	we		SAND Willy chy	SC	MORIT	0.0			H
	-			1			Clay w/sand Est	۲		900			┝
	27	\leftarrow		26-27	Cone	PiNK	DAND. YFINE sity	311	(7.54c 8.3)	0.0	Н		\vdash
	+		 	27-29	, .	yen	WSAND who clay cean	8	C54 70	0,0			\vdash
	\			39-33	Coose		SAND COSYLES	X	MOKIT	∂, [©]			┝
	32		 	33-57	16080	BYK	SAME TO ASOLE	50	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	80			-
	+		<u> </u>	D) - 1/2	JIFF	Dak	Clay's u price some	CL	7.542 AL	<u>0.0</u>			-
	\vdash			37.5-39	Love	STrove	SAND w/clean Finesh	\$, , , , , , , , , , , , , , , , , , ,	0,0	Н		H
	H			39-40	LOOSE	PINK	Classic BO	\propto	75 40 96 1.540 1/4	0.0	Н		\vdash
Wher	rock c	oring, enti	er rock bro	40-42 okeness.	DIFF	Icary	[CAY w/ sand seam	<u> </u>	113 9R 14	0/8		<u></u>	

HIL	LING	RIG:		DON1 SON1			GEOLOGI DRILLER:		Cous Nº 1501 Rochney Park				
ampie No. and ype or RQD	Depth (F1.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened interval	Soil Density/ Consistency or · Rock Hardness	Color	RIAL DESCRIPTION Material Classification	U & C & .	Remarks	Sample Sample	Sampler BZ	Borehole** Bulp	(pp
	47			42-47		1 BB 1	SAND: COAIXENET	V	Gravel > 4.8	0.0			F
	+		<u> </u>	47-48			SAND WICHTARA	50		0.0		_	ł
	+		.6	50-51	COOSE	Toro	SAND: W/clay some CLAY w Fine sand	SC	US48 1/4	23			t
	\top		10	51-54	Last	E.	ENDIWIFILE SAM	SW	Notted IT-Red	00			t
				1	Loae	Pink		1		20			
	53			1	JIIKK	LT	CLAY: cow plasticly	1-	DAMP	00			I
	1		10,	57-62	FIRM	CIGN			G. 5/2 /2) DAME	00			ļ
	67			102-67	(000E	Pink	SAND PROTEO	\$c_	(7.54x 8/3) 400	Đ.C			ļ
	(67-72	Coost	Pink	SAND: FINE JANU	SV	(7.5 yr 8/3)	0.0			ļ
	1		W	72-73	(exac	TAN	SAND	ZM	(7.540 4/W)	0.0			ļ
	<u> </u>			73-77	COSE	Pak	SAND, Fine silty	ISM	75/1 /2 6. SI	0.0			ļ
	77		 	77-80		380	SAND, FINE SAND	SM.	(ENLOSP	00			ł
	87		5	180-82 1	1 (\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	JAND: FINE SAND	5m	Mois	0.0	Н		ł
			 	•				╁					ł
			 	1			16/minated @ &	_					t
			†					⇈					t
								T					T
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													L

RO.	JECT LING	NAME NUMI COMI RIG:	BER: (Domi Soyi	Lens C 150	ver	DATE: GEOLOGI DRILLER:		MW-DO 11-5-07 Cous NElson Rativey				
					N	MATE	RIAL DESCRIPTION		/	PID/FI	D Res	ding (ppm)
mple No. Ind pe or IQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S .	Remarks	Sample	Sampler BZ	Borehole**	Driller BZ**
	Q			0-6"	Losse	Gay 30	SIT silly chy what	MH	7.6 gr 4/2	0.0			
		/		6-21	LOSE	13,0°	SITE WICH SCAME	1	2.540 3/2 ay	20			
		/		21-31	Liose	Bri	SHI Zucks	_	Dry 2.54 5/x	0.0			
	+	/	1	3.4	2005E	Cry	BIK, SITI OF GANC	MC	2.542 N 25	o c	Ш		\square
	+		1			0,4	Graveli (F.11)	_	-	_	Ш		
	1	< >		4-5	Dri	Ork Ory	Clay: cean to FAT	CH	D. Sya NX	00	Ш		\Box
	7			5-7	FIVM C	7-BC	SAMD, soundy clay	JC-	WHI JA Th	00	\sqcup		\dashv
	+	\leftarrow	\	7-9	FIRM	white	Clay: FAT Clay Sunth	CL	w/sond sexes	00	H		-
	+		θ_{l}	9-11	MAY	Pink	Clity in come 540 1/2	cc	in pry	g.0	\vdash		-
	+		/	11-13 13-14	1 de l'	Whate Pink	Clay year chy 54n /2	α	pry	0.0	\vdash		_
	+			14-17	Maylika	Sent for	CAUD THE AS HEAR	CC	(New	D.O	\vdash	\dashv	\dashv
	<i>1+</i>		`	17-18	Cos E	CT	SAUD: Peoply Grades	80	Hed DENSE	<u> </u>	H	_	ᅦ
			1		lane	Pink		Se	NO FINE DAMP	0.0	\vdash	ᅱ	ᅥ
1			4	20-24	Loose			50	DAMO 750 85		\Box	\dashv	一
	37			24-27		Pink	SAME AS Above	50	34 - (0.0		寸	7
			. 4	77-24	very Loose			50	FAM Q	0.0	\Box	\dashv	ヿ
				29.30	1<	11	JAME AS Above	17	• • • • • • • • • • • • • • • • • • • •	0.0	7	\dashv	1
			10	30:33	11	17	JAME AS Aboric	"	10	24			1
	37			33-34	VEN LOOSE	Redeby Sestow	SALID: SYL	50	.DAMP	00			
	4			37-40	LOUE	Pink	SAND. CLEAN TSUN \$3	50	whelen pape	þ.a			
	l		10	40-42	(I	11	SAME AS ASOLO	16		O'd			
	47			4 -47	ligge	pink	SAND. W/Clay seam	Ø	7.5ya 3/4	20			
\bot	44			47.51	LOSE	B1 D,NK	SAND: w/c/sy some	3,0	/	0.0			
				57-52	Word	Pink	SALD 750x 83	50	WET	0.0		- 1	

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7		RIG:		20/1/6	/ SeJ	IATE	DRILLER:	Πİ	Radres	PID/FIC) Rea	ding ((ppn
Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color		J # C # *	Remarks	Sample	Sampler BZ	Borehole**	Driller BZ**
			, , .	52-54	HAND	Dirk	Clay w/ rine sands	MC	my	00		_	L
	- 1		1D-				JEAMU 54x 7/2	ļ		00	_	<u> </u>	Ļ
	57		<u> </u>	54-57	HAYD	Tray	Clay i Rock How Enix	MC	10/2 4/2 Dry	60		<u> </u>	igspace
	_}			57-58		Bru	Clay: w/pine sanda	46	ary	ں.م			igdash
	\perp	/_		58-60	Lose	Rink	SAND Very FINE	80	7.54R 1/2	0.0			╄
		_	11	60-62	st.	10	SAME AS Above	p	· 44 ·	0.0	_		╀
	1	\angle	<u> </u>	62-64		<i>"</i>	SAME AS Above	P	coy c	<u> 60</u>		_	lacksquare
	67	\angle	4	64-67	Lower		SAND: VERY PINE	<u> </u>	1540 m/8	0.0	_	<u> </u>	lacksquare
	71	/_	7	67-41	1051 X	300	SAND VOLY FIXE	_	7.54 en 48	00		_	╀
		/_					·	↓_	, ,	╀	_		╄
		/	ļ				100	 _		—			╀
		/					Branted (a)	12/		-		<u> </u>	╀
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	-	/			<u></u>	<u> </u>		<u> </u>		_		<u> </u>	Ļ
		4								_		<u> </u>	Ļ
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	t	Tetra	Tech N	NUS, Inc	s.	<u>B</u> Ç	DRING	<u>LOG</u>					Pag	e _/	<u>_</u> (of Z	2_
		NAMI		4AM	Unk	Air	part		RING N	lo.:	Ha.	21					
		NUMI COMI		*****	r /. .		*		TE: OLOGI:	cт.	10-25	5-02		*************			
		RIG:	raini.	SONI	1 Cong	400			ILLER:	51:	Roche	NE/5	<u>ليد:</u>	**********			
				1 70.3		MATE	RIAL DESC			T-	rogre	4	"" /"	ID/FID			
Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness			il Classificat		u s c s ·	Re	marks		Sample	Sampler BZ	Borehole**	Driller BZ**
	O,			0.911	love	Bro	SilT inm	. Janu / .T	ills seile	41	5w >	14 14/54		٥٠٥	T		
	7			9"-2"	Last	RED	0,15	Wille JAN	1	114		~ 414 \		. 1	\neg		
			1	2-41	Consi	Red	S. M.	<i>j</i> ,	1/60	\$022	34.			20	\dashv		
			8	4-5	Hard	Ked.	Class:	ICIM A w/ Kine		01	55.56		f	ه.د	\dashv		
				5-7	Loose	BIK	Fill	wire	,	1	37/6	10x 25	7. S	73/	7		
	8			28	SOFT	CTY	Pla!		ani Clas	CC	1541	111	'	121	7	7	
				8-10	Film	DYK	Clay:	wlfine	e sand		542 3	1, 3		00	\exists	1	
	\perp	/	10	10-11	FIRM	CTY	SAND:	w/clan	Jegna	8				C) a			
	\bot	/,	10	11-13	Loave	36	SANO.	MOIST	SITY	ئال	542 7/	V511	1/4 K	لرد			
	Ļ	\angle		13-14	(1	11	11	11	4	sc	7.		7	00			
	18	\angle		16-18		"		10	η,	80				20	\bot		
		<	~	18-20	Loux	Cort	SAND:	5: / ty 5	med	SM	(7.5ya	7/2 1	1601	20	_	$ \bot $	
		<	7	20-24		11	11 23			"	*	<u> </u>	<u>~</u> c	2.0	_	\dashv	
	28			24- 28		7	ý	"		ec.	"		_ 6	5.0	\bot	_	
	+	$\langle \cdot \rangle$				B_{i}°			46)	SM	1110/11	TIL	60.47	20	_	4	
\vdash	+	$\langle \cdot \rangle$		36 - 37		ч	" JA	Akere	9	u	` (/	M		امد	4	4	
-		\leftarrow	10	32-39		d	4	"	•1	7	ę	nvi		0	+	\dashv	
	38	\leftarrow		34-38) ₍ (9	<u> </u>		<u> </u>	۲	٤	n. s	w c	30	+	\dashv	_
	((0			38 .V.			SAME		sour			/	4	0.0	+	\dashv	
	48			4/8			Same	AS A	bare		7.54	<u>e 8/c</u>		20	+	\dashv	_
				48-49	100xE	Gry	SAND"	w/s:1+	/w/chy	50	Sik	<u> </u>	<i>vel</i> b	0	+	+	
				49-50 50-52	1000C	30	SAND:	w/ CCARS	E Grand	7	Syr	9/8).	1140	<u>id</u>	+	+	
$\vdash \vdash \vdash$				(2-21		. 0	JANI)	5:14	stred 1	JW.	Syc	72)4 1	1	0	+	+	\dashv
				10-04	LOOSE HAND	30	SAND:	, i		7.4	5/n 5		1000	0	+	+	\dashv
			r rock brol			Gry (irry. "		<u> </u>	04	(59K	7,),2	mp 10	<u>ال.</u>	丄		
" includ		or reading	g in 6 foot	intervals @	borehole. In	crease	reading frequenc	y if elevated	reponse re	ad.	В	Dr ackgrou	rilling ınd (p	Are pm	a):[/	0 4	5
Conv	- hetre	to Wel	ı.	Yes	+		No		Well I D	4.							

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DHIL	LING	RIG:		_578W		IATE	DRILLER:	T	Rochery Por	PID/FIC	- Per	:
Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened interval				U & C & .	Remarks	Sample	Sampler BZ	1
		<u>Z</u> ,		57-58	lase	Pint BN	SAND! Gisja 42)	501	moist	0.0		
		\angle			HAYD	Corge	Clay: W/ TrACK of some	dec	(7.54 NZ) 2 mm	0·0		
		4	ļ	62-64	Lagre		SAAN W/ 51+	SH	(Syl 92) worst	0,0		
		/		e4-7/	HAVE	Pink	Clay in 1 rint som	CC	(54 × 42)	06	_	
				1	MI	Dink	SAND. WICKY REAM!	x	(541 42) MOTO	0.0		
				1	 	PM	Clay: w/sans	tc	(5y, \$/2	6.0	_	
			ļ	1		1	JAND. w/clay, a con	pe	(544 Yeva,1	00	_	
				4.5-25	111111	Pink	CAY! iy sand seam	CC	(5 yn re) MIGHT	0,0	_	-
					Coose	DINK		x	Bya Must	0,5	_	
				KOS 253	Lowe	Gry	SAND. Wiffine SIT	X	P. Synthowort	00		
			_	1		_	/	╄		-	<u> </u>	
					19	VM	white a 80	╄	[-	-	
			-	1	1			\vdash			-	-
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				1.7				╁╴				
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PRO DRIL	JECT LING	NAMI NUMI	E: BER:	NUS, Inc Alpha Boars	1 State + Langu	Aig en	DRING LOG BORING N DATE: GEOLOGI DRILLER: RIAL DESCRIPTION	ST:	Pag MW-JZ 10-24-07 GUS NYSSON RODNEY)) PID/FII			
Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	(Depth/Ft.) or Screened interval			Material Classification	U	Remarks	Sample	Sampler BZ	Borehole**	Driller BZ**
	0			06"	1005E	30	Sittisily Clay W/Ruots 2.5ur 4/6	DL	DIMP	0.0			
							W/Ruots 2.5ve 4/6				П		Γ
				6-2	Loose	RED.	5:17: 2.54 16	cc	DAMP	0.0			
			\				w/concrete fill			Π	П		
			1	2-41	100 sie	BIL	5.17: W/FII rest	OL	2.5ye N2.5	46.1	П	**********	Γ
				4-5'	Firm	GAY	Clay: w/ File sant	06	2.54 JAMP	170	\sqcap		Г
							Seam.		# # # # # # # # # # # # # # # # # # #		П	-	
	8			5-8	Loose	CIV	SAND. DAMP s/h	54	,	12.3	H		
	Ī			829		<u>U. y</u>	said.			12.3	\Box		
			\	8-9	1005F	Ork GW	SANDI SILLY SAND	Sm	DAMP 2.54R NY	٥٥			
	\top		.0.	9-11		yeller	SAID WILL	80	5ux 7/3 DANO				
	1		1	11-13	FIRM	Yello	SAND W/C/A SEATED	1	<u> </u>		\dashv	\dashv	
	1			13-15	Love	Reddis		۴			\vdash	+	
	18			15-18	Lavie	4.200	SAND; w/ silty AIRE		Syx 96 Damp	20	\dashv	\dashv	
	1			18-19	1.0056	ye llow	SAND. 75VA 46	311	/	0.0	\dashv	\dashv	
	+			1420	COSE -	yellin	and the fact			0.0	十	\dashv	
	+			21-22	100	DK.	CA 10: 1: 1:	544	wet	00	+	\dashv	
	\vdash		- 11		100se	REI	SAND, 0/5:/+	514	noisi	0.0	+	\dashv	
		\leftarrow	\	22-25 25-28	MAND	GN	C/AY: 2.542 1/8	04		0.0	+	\dashv	
\vdash	38	\leftarrow		מו מו	FIAIRI)	THY	CAY! WI FILE SAND SAND		7	2.0	+	\dashv	********
	10	\leftarrow	Q	18-27	PIPAI	CTY	CAY, U/FINE JAMO	CL	2.54R NYUMP	0.0		4	
\vdash	+	$\langle \cdot \rangle$		31-31	Laste	74	SANDICIANEY SANCES,	<u> </u>		0.0	_	\dashv	
\vdash	+		7	31-32	FIFM	Bry	Clay! W/Five small bonds	cc	35xx DAMBY	00	4	4	
 	- -	$\langle \cdot \rangle$		32-325	Look	(24	SAND: 15. 14 Clay	86	2.5 yary wet	00	_	\bot	
	$\downarrow \downarrow$		4	32,5-33	First	By	Clay! w find sounds	CL	11 11	20	\perp	$oldsymbol{\perp}$	
	1			33.5 3N	FIRM	Bry	Clay, wifine sands		9.5 / MIST	<i>7</i> 0			
		-	r rock brol g in 6 foot		borehole. In	crease	reading frequency if elevated reponse re	ad	Drilling	η Δε	98		
Rema				-					Background (2.0	0

Converted to Well: Yes No Well I.D. #:

TŁ	Tetra Tech	,
POJECT	NAME:	illa

		 -	,	11/1	1.1		DRING LOG BORING N			ge _		٠
		NAMI NUMI		Jum	77/14	1711	BORING N DATE:	:.OV	10-29-07			
			PANY:	Dem	of los	yen		ST:	Chis Noto			
DRIL	LING	RIG:		50.4	2 180	3	DRILLER:		Redney	·		
					N	MATE	RIAL DESCRIPTION			PID/FI	D Rea	iding
Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soli Density/ Consistency or Rock Hardness	Color	Material Classification	n s c s .	Remarks	Sample	Sampler BZ	Borehole**
				34- 3 5	find (ay	Clay affine some some	الا	25yr 24	00		
	\perp	\leq		35-2	11	1	TAME AS About	رد	1 8	00		
	38	\angle		36.38	"	54	no AS Above	02	11 14 11	00		
		\leq		38-40	hill	Cmy	Clay wither smelled	100	. 3.5yn Ny	20		
						ary	SAND! w/c/ay sisms	SC	3.542 MOIST NG	0.0		
		_		41-43	Ji. FF	Cry	Clay wifein silly sou	a	2. Syn 124 N/7	00		
		\angle		43-45	1	"	JAME AS Above	ii	DY	00		
		\angle		45-47	11	4	SAME As About	a	77	00		
		\angle		42-48	11	11	STATE AS ASON	cc	lo.	0.0		
				48-51	Firm	Gry.	Clay. Low to Fost	CH	,	0.0		
\bot		\leq		51-53		ry-30	Clay informer sand	E	2.51h Miltines	0.0		
		\leq		5 <i>3-54</i> 0	SOT	Expa	SAND Marsheld Line	50	2. spend of the chap	ø.0		
\perp		\leq		56 58		11		Ĉ	(1) James (1)	U.C.		
_				58-61	STATE	9%	SANDE morbled of IT	SM	5/2 /1 WET	00		
		\leq		61-63		The same	CAY! Wiffere and	CL	7.5,00 7.5 5/6	ون		
					leese	Red Gvy	JANO: Woilt mout	ъц	2.51 4/4 M	00		
_					STIFF	ar	Claye stane warme	20	2.5 1 NG and	00		
				62-68	have	B.	SAND. Worth, day	Œ	2.50x 4/4/1000	50		
\perp			å	4-64	lave	11 Gu	SAND of Fine smel	يمعتل	To ys IT wet	0.0	T	
				69-13	Lusc	UT CO	SAMDi wifere soul.	OM	1. SYR WEST MOIS	60	\Box	
				73-78	Work	Jella 300	SHNDickent sand	pu	7.842 48 MOUT	60	T	T
				18-83	look	City	JAKO, FETEROS	Sp	5 va 8/1 mout	00	T	
							/?		,			T
					11911	14	14 (a) 83'				T	T
ľ		/								T	\top	丁
	monit		rrock broi g in 6 foot		barehale. In	crease	reading frequency if elevated reponse re	ad.	Drilling Background			
	_	to Wel	l:	Yes			No Well I.D	. #:		(ppn	1):[

PRO	JECT	NAMI	BER:	-		- //;	BORING N DATE:		19-30-07	~			
		i COMI i RIG:	PAINT;	Teary SOV	Carry		GEOLOGI DRILLER:	51:	Rodney				
							IIAL DESCRIPTION	Т		PID/FIL) Rea	ding (ppr
Sample No. and Type or RQD	(Ft.) or	Blows / 6" of RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness		Material Classification	U S C S .	Remarks	Sample	Sampler BZ	Borehole**	Driller R7**
	0			0-3	last	30	Sill silty clay 574/6	OC	25% Cornely	00			r
	ì			3-3.5	Had	NA	CONCRETE: whiteson			00			r
			6	35 %	LOUNE	BIK	SilT' w/genels ste	MH	542 2.5/ was	0	F		Γ
			8	4.0 5.0	POST	BIK	Clay w/ Rests organic	Ċ	1642 3/ mil	3.0			
	8			5-8	Joff	Cry	CALL FAT daymen	CH	IN OGON 31Mg	00			
				8-10	30,47	ery	Clay; FAT clay	CH	MoisT	20,			
<u> </u>	1			10-11	07.14	30 CM	CLAY W/Grands V/Fre	CL	Sands Subjected	0.3			L
	Ц_	\leq	10	11-13	Luse	3%	SAND. Fine and	ip	<u> </u>	<i>0</i> -7			L
	 	/	1	13-15	Litell	300	SAND, That MY	09	104x 94	æ			L
-	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			15-18	11	1,	JAME AS About	╀	11 11	ند			_
	18			N2C	Laux	7378	SAND: Cay of me	50	10 /n 7/4	ن.ن		_	_
	\vdash		-	22-24	Liebe	30	SAND: 14/2 6/8	+	MOIST	00		-	-
-	H		10	24-24	6000C	<u>'</u> -	SAND: 1044 6/2	50	1' pmp	0.0	-		-
<u> </u>	1/2			26 28		7/	SAME AS ABORE	36	1 WANT	\$C		_	_
-	13		1	36-30		Bre	SAND: Port Gradel	50	10 10 6/8	90 90			-
-	38		 	30-38 20-18	ierst		SAME AS Above	130	10 yr 9/2	oυ			_
	+		N	40-49	lorse	10	SANDI REFLE FOR	82	10 ye 4/2	0.0		\dashv	-
 	+		0,	4	Liese	50	SANDI Names	50	NYX \$3 WET	0.0	\dashv	ᅥ	-
	48			45-48		130	SAND: 100 GR	50		0.0 2-0	\neg	1	-
				48-50		Bio	SAND, Dome Joak	50		6:0			***
				50.51	Louse	17-13	SAND, Yelsy Rems	50	754 3/2	20			-
				51-52	40056	254	SAND. W/COSHEN729	00	1.54 /4 72.9"	00			-
				. دا	STIFF	17-0 17-3	CLAY! WIFINE SAND	CC	10 12 th / 18	00			
	l			54-55	Loose	Red Gry	SAND. Fire and	درد	2.54K 4/8	6.7			_
			er rock bro		h havabata d		reading frequency if elevated reponse i		Drillin	A			

		[7	E	Tetra	Tech N	IUS, Inc	.	BC	RING L	.OG		,	Page	в <u>Ә</u>	<u>)</u> (of =	<u>_</u>
		PRO	JECT	· · NAMI	E:	14/100	fn 5/20		high	BORING N	lo.:	Mo.	23				
		PRO	JECT	NUM	BER:					DATE:	o.T.	10-30					
				i COMI i RIG:	PANY:		lang ve	<u> </u>		GEOLOGIS DRILLER:	51:	Roduce	16/50	<u> </u>	/		*********
	1				T	· XVV		IATEI	RIAL DESCR			\rightarrow		ID/FID	Rear	ding (ppm
		Sample No. and Type or RQD	(Ft.) or	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval		Color		Classification	U S C S .	Remari		П	Sampler BZ	Borehole**	Driller BZ**
			58		10	5-58	SOFT	and	SALLO: "	I Clay Som	УC	10R 3/3	MOINT	ں ہ	7		
			1			58-60	777	I.	Chr. Win		Ľ.		2011	00	1		
			 			60 B	Y	Per f		/ che sissus		wet		on	\exists		
						13638		U.	SAND W	. /	PC	wit		0.0	\exists		
						63.5 4	777	Corn	Clavi no	a withing		Cu Ti		0Û	\exists		
						64-60		Rul	SAND:	W/c/sy NEAM		2541	4/31114	00	\Box		
						68 70		Pint C	SAND.	clair Damp	50	2.5 40	6/4	0.0			
						70-74	//	11	JAME	AS Abut	Se	2.5 ye 9	14	هر			
	74		78			24-78		11	11	a a	<i>'</i>		·/	0,7			
						77.82	.,			// 'V	٠.	i,	٠,	0:0			
	şh		1		<u> </u>	82-84	0.000	Ain	SMUD:	Clean	5	2.5/2	44	00	$ \bot $		
and the same of th	Ø		88			81-88		į.	v		"	1-	·/	×0	\sqcup		
														_	_		
		<u> </u>	<u> </u>									65°		_	_	_	
									EMIN	14 full	2/	- 80		_	\dashv	_	_
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			<u> </u>		ļ									4	4	\dashv	
			<u> </u>		<u> </u>	<u> </u>								丄			
		** Inclu		nitor readi	er rock brong in 6 foo		a borehole. I	ncrease	reading frequency	if elevated reponse r	ead.	Backç	Drilling ground () Are	эа 1):[04	2
		Con	<i>J</i> erter	to We	all·	Yes	V		No	ا الم) #						
Promotion &		CON	4 G1 (G(~ (O 446	J11.	100	f	•		77 Gil 1.L	· · · ·						

PRO DRI	JECT	NAME NUME COME RIG:	BER:	Marth Buar Santi	. ,	k Yes	BORING N DATE: GEOLOGIS DRILLER:		UW-24 11-1-07 Bus Nelson Lachey Por				
Sampi No. and Type o	(Ft.) or	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Deptl/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	RIAL DESCRIPTION Material Classification	U 8 C 8 *	Remarks	Semple semple	Sampler BZ	Borehole**	Driller BZ** 3
	0			0-6"		Red Bro Red	SITI W/9ma wot	SM	1042 46	00 00			
	Ц	/	Q	2-5	SOFT	Cony	Clay: 1ean 5/4 ch	Cc	(2.54) 5/2	00			
	8			5-65 65-8	JOST	Gry	Clay: wyfine 5:14 cg		2.542.5/2) 2.5/2 DAMP	00			
	Ľ	\mathbb{Z}		8-11	FILM	Gry.	Clay Fat chy	CH	25MD820	0.0			
<u> </u>	+			14125		CT-G	May: w/ sand seam	ce	542 7/1) DAMB! (542 44)	0.0			
5	18		U	12.5-15		Cry	Clay: w) oilty sand	CC	(542 711)	0.0 0.0			
				18-23		CT-C	SAND, U Shed	S	me (5/2 7/1)	00			
	Ш			23-25	1	Bru	SAND: WIChy	X	(25/2 4/4)	0.0			
	20		10	1	2708F		SAND: WITH JUNE	5 <u>C</u>	(2.5/2.4/W)	0.C 0.0	H		
	1			1	571KF	7	SAME AS Above	e l	SIR DAMO	0.0			
	\Box		Q	<i>3</i> 0-33			SAND: FINE CLOW SALL	Sp		0.0			
	++		\ \	1	Cose	_			6.5 10 Yu tramp	00			
<u> </u>	38			38-40	T			20 20	(25 Yudamp	00			
		Z	Ó	40-43	Lause	Bru	SAND, WICHAU SEAM		6.5 44 HG-Gray	0.0			
	48			43-48	(enx	BA	SANDI W/SMAIL CHY		Seam 35yn 34) oi			
<u> </u>						,			161			\dashv	_
				-	16sm	7 102	tect (a)		48				
· Whe	n rock c	oring, ente	er rock bro	okeness.							Ш		
	ude mor narks:	itor readir	ng in 6 foo	t intervals (2 borehole. I	ncrease	reading frequency if elevated reponse r	ead.	Drillin Background	g Ai (ppr	rea m):[D. 0	2

		PANY:		c 150		DRILLER:	ST:	Rudney Po	<u>~</u>		
Depth (Pt.) or Run No.	Blows / 6" or ROD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness			U	Remarks	Sample Sample	Sampler BZ	Borehole**
9	7		0-6"	Loose	Bro		u	(7.542 430m	ع رن		
		1	(" 21	11056	R4.	7	11.1	(25. 4/2)	<u> </u>	-	
+		0	1				T		7.1		
\top		<u> </u>	T						3.0		
						W/ROOK and Fill					
8			F8	CLOSE	GW GW	Fill wood/s: Hychy		1 45 25k NES	(B		
1			8-9		Stic.	All: wood / Silty Mi	07	(2,5 VL N2.5)	T		
		0	P-12	SOFT	GN	Clay! lear moist	آم	8.5 4 NY)	00		
		7	D5-B	SOFT	BK.	J. IT CYGAN CONT	M	15UR 2.5/2)	00		
			13-14	<u> 170</u>	233		CH	17.5 VA 5/2	00		
18	/_		14-18	JTIFF	Ty.	Clay lear clay	در	(54 71) vame	0.0		
4	/,		18-19	STIFF	GRY	1 - 1 1	α	(10ye 41) name	0,0		
\perp	4	<u></u>	19-20	STIFF	Bed	Clay: lear clay	CL	(10/1 5/6) DAM	69		
	/_		20.22	OTIFE	Gal	Clay: silty clay	CC	Damp	0.0		
\bot	/		26-33	Cost.	201	CONTRACTOR CONTRACTOR	α		ემ		
\bot	\angle	10	4	5714	30		ک	HOYN Y	0		
\bot	_	٧	•				رد		4		
1							CL	(10 yr 81)	Ord		
20	/		1				٦		0.0		
+	//		1	SOTT	redy	SAND: Silly Sand	SM		0.3	\dashv	
\dashv	\leftarrow		4	11	11	JAME AS Above	٨		O,O		
\perp	\leftarrow		4	· · · · · · · · · · · · · · · · · · ·	Lp	SAME AS Above.	Şη	DAMP	ઇ <u>.</u> ઇ		
38			34-38	ή.	<u>'\</u>	SAM AS Above	M	DAMP	0.0	\dashv	
	LING LING Depth (Pt.) or Run No.	LING COMILING RIG: Depth Blows / 6° or RQD Run No.	Depth (Pt.) 6" or Recovery / Sample Length	Sample Lithology Change ING COMPANY: Bar Largy ING RIG: Suric 150 Depth (Pt.) or ROD (%) Sample Length No. O O O O O O O O O O O O O O O O O O O	ING COMPANY: Bay Large of Color Rich (Pt.) or Rob (Pt.) or Rob (Pt.) Sample Length (Consistency or Rock Hardness (Color Rock Hardness (GEOLOGIS ING RIG: JOVIC 50 DRILLER: MATERIAL DESCRIPTION Material Classification Material	GEOLOGIST: DRILLER: Depth (PI) 6 or Recovery Change (Depthyr.) NO. (N) Sample Length Recovery Change (Depthyr.) NO. (N) Sample Length Recovery Change (Depthyr.) NO. (N) Sample Length Recovery Change (Depthyr.) NO. (N) Sample Length Recovery Change (Depthyr.) NO. (N) Sample (De	SING COMPANY: ING RIG: Source So Bount Blows (Fi)	AND COMPANY: Brown Sample (P.) Son Blows (P.) Son B	GEOLOGIST: JOHN STORY COMPANY: JOHN STORY COMPANY:	

		RIG:		سک		O	DRILLER:	T	Redny Pour	PID/FIC	Rea	ding	(p)
Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RGD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S ·	Remarks	Sample	Sampler BZ	Borehole**	T
		/		38-41	louse.	-7-130 7400	5AND: 654 72)	SM	moist	0-0			1
				41-43	Lowe	Pink	SAND: 51/ty	34	FINE FISH 12	00			ļ
		\angle	1	43-45	((4	some 48 pole	Dm	10 48	00		_	1
ļ			 	45-47		200	James as office	M	., '/	انوه		_	1
	48			47-48		Bro	Clay (10 y, 3/0)	C	DAMO	00		_	ļ
	-		17/	48-50		Pink	OAND, STYSALO	152	6.54x 46 VAMP	0.0		<u> </u>	+
<u> </u>			1/0	50.54	STIFF	Red	SAND: SAND Welm	S.C.	(7.5 / 12) "	مم		-	+
 	528		 	54-58	To the second second	Bro	CIAY W I SHE SAND	CC	(3 XV 3/3) "	0.0		-	1
	H			1	JAFF		CAYWIFIN SAID	CC	7.54 572 JAM	0.0		-	┨
	 		,	62 65	COURCE	STO STO	CLAY'- WY FINE SAND	a	(10 VA 81 DAM	0.0			t
				T	COOK			8	Mois!	0.0			t
	29.		1	66-68		250	Clavia Kac BAND	ci	254 N/3	U G			t
			<u> </u>				3						Ì
							TOppeel STIFF		chai				
									7				I
							Terminated (8					
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<u> </u>			ļ					-					ļ
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		\leftarrow						\vdash			\dashv		l

	PRO DRIL	LING	F NAM F NUM G COM	RED.		op R	oad			MW-321 8/31/69 DLM		<u>L</u> (
	DHIL	LING	RIG:	_				DRILLE	R:	Del				-
	Bemple No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval			RIAL DESCRIPTION Material Classification	U S C S ·	Remarks	Sample	Sampler BZ	T	4
·					ð.:	3,00	7.0	rown SILTY SAN graves tompact, week of LAY, soft, high	eme	ntetran dry	Vé	175	100	
7					10-	gray	SI	иту SAND, сотр	• E+	slight morsh		1		I P
רו					15.5	-gray	, CL	HYEY SILT, Some	,00	rpact, mois	F	0 3	+,	-6
* aa'	7.0				99-	and	ish-	brown SAND I	SA Se	ND, v. frae-a			1	July 354
a					-	30000	far	ome st!, crangish s a cream, szery cz e colored sawo e a wogsh-brown, medic	1.(7	prijerac jeho	WS		pro.	Sh.
-35'											+	F		_ P]
			1	7	31	38.5	hio	her Silt-content, (Post	(फ्रांचार	#			- 6 <u>T</u>
↓ 47 E	han mol		1	ck broken			1		+		+	H		-PD) -PZ1

Converted to Well:

Yes

No

Well I.D. #:

PRO PRO DRIL	JECT JECT LING	NAM NUM	E: BER:		e. PROO	rd	RING LOG BO DA GE
						MATERI	DR AL DESCRIPTION
Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Semple Recovery / Sample Langth	Lithology Change (Dapth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock	Color	Material Classificati

Page 2 of 3

		LIECT	NUM	DED.		p Kor		BORING N	0.:	TGE WM					-
100	DRIL	LING	COM	PANY:	Boar	+Long	uta	GEOLOGIS	ST:	Prw			_		•
CAN AS NO	DRIL	LING	RIG:			4.	27	DRILLER:		Del					•
J. 22, 926	Sample	Depth	Blows /	Sample	Lithology		ATE	RIAL DESCRIPTION			PID/FI	D Read	ding	(ppm)	İ
Triest of Los	No. and Type or RQD	(FL)	6" or RQD (%)	Recovery Sample Langth	Change	Soil Density Consistency or Rook Hardness		Material Classification	3 8 6 8 .	Remarks	Sample	Sampler BZ	Borehole**	Driller BZ**	
(20)			_			cream	900	idma to orangish-	bro	wn				П	l
7.	\vdash		\leq		54	ω	C	SANDI SOMESTH,	40	2/5	e	ny	n	æd	stale
5			/				mac	e compactsoird cream	7	est few mches	Н	\dashv	-	\dashv	- 610:0.1
55 65 57			\leq		56.	5-PG	rple	· cream, mottled 5	77	CLAY, 11ght	m	13	ž.	ha	nd,
رم رم	\dashv	-	\leq			CEAM	200	mpo moist					J	œ	J 190:0.
j					61			THYEY SELT I AND	, 2	hight moist,	mi.	ख	14	4	L PPn-an
					63	- crea	ne	prangish - brown, Sh some surple color o	N	medium-q	ran	co	,	00	261 -170:00
ගු	_	_													
94. compt	ma	lay	25		69	Crean	1,0	AYEY SILT, purplish	-4	rown tyell	w	14	-	ore	iwn
10' more	\dashv	十		-	69.5	Mos	ty	cream with few so	7	t velvas	4	+	4	4	
			7		75-	interm	Ha	readish-homan all	00	l hard no pla	4	1	1		L
77		_			"			cream SZLTY SAN	5/	LAYEY SECT,	04	2	#	sik	ant.
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, .	+	+	1	\neg	F	\dashv	+		+		+	+	+	4	
**		monito		rock broke in 6 foot In		orehole. Inc	rease re	eading frequency if elevated reponse read	 	Drilling Background (p					
C	onver	ted to	. Well		00										

ORIL	LING	RIG:			N.	MATE	DRILLER:	DRILLER:			8/19/09 SBC / DL M				
ample No. and ype or RQD	(Ft.) or	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soli Density/ Consistency or Rock Hardness	T	Material Classification	808.	Remarks	Sample	Sampler BZ		Driller BZ**		
_		7							Sand, fine	L					
		$\overline{}$				_	grained, Loase sligh 2-7 Brown, Silts		nd, Compact	+	-	-		- PIT	
		\geq					slightly moist	104	10, 20, 10, 10, 10	T				00	
	5	4		1		100					- 18			PI.	
_		\leq		G	9		7-10 Red Sandy								
-		\leftarrow		1			7-10 Red, Sandy Moist.	191	+ compact,	-	Н		_	-6I C	
		$\overline{}$		0 V			7 (0/4) .	+		\vdash					
	10	/		+			10-14 Cream, Silmy (91	, compact.						
_		4		î,			no plasticity, MOR	E						ll e	
-	-	\leq		*		-	0 (1)	-	la 14 - al-1 . 1 . 1 . 1			_			
	. 1		107.1	98 I			14-23 For Soft	1	GY, Slightly had, 1	W.	4.			#	
5	15					Contract (Moist RC	T	OHT, COMPLET	Н		7			
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				l							+	+	٦		
				Benjan J.											
\dashv	-	4		°73/C		\dashv	23-24 Cream, Sunky		, Conget, moist		\perp				
+	25	$\langle \cdot \rangle$		375,001		\dashv	24-28 Creen, Silty C	Ψ,	Compact, moist	\sqcup	4	4	4		
_		ring, enter	rock brok	PICH						\sqcup		_	┙		

DRII	LLING	NUMI COMI RIG:	PANY:		009	nt Long P		BORING No.: DATE: GEOLOGIST: DRILLER:				3C/OLM	PID/FI	D Res	dino	(npm)	- 1	
Sample No. and Type o RQD	(Ft.)	Biows/ 6" or RQD (%)	Sample Recovery / Sample Length	Lithol Chan (Depth or Scree Inter	ige v/Ft.) ned	Soli Density/ Consistency or Rock Hardness	Color		Classification	U S C S *	Re	marks	Sample	Sampler BZ	Borehole**			
	-				2.			28-48	Coum C	W.W.	Ougo	la Silta	_	_		-	-61	
				昌				Sand,	Cream, O Finc to	Medi	mara	ned, loose	1	vijt				
	30										Δ.							
												Manifelius adautum managari	_					
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	40			Sch	X													
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				gmu)	\ \							***************************************		_				
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	7.3			45' F	랅				•					\dashv		\dashv		
					랅									ᅥ	\neg			
				1	닭			48-27	Gray, Fed	ડિવ	Wy Sil	Compact		\dashv		7	-bt	
					$\exists \llbracket$			moist be	compay wet.			-1						
	SU		r rock brok	<u></u>					V								PII	

		RIG:	PANY:	!	derj L			GEOLOGIS DRILLER: RIAL DESCRIPTION) i .		PID/FII	D Rea	iding ((maa)	- j
Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Litholo Chang (Depth/ or Screen interv	Ft.) Soil Cons	Density/ sistency or lock dness			U 8 C 8 *	Remarks	Sample	Sampler BZ		Driller BZ**	
		7			<u> </u>			F) 57 C							
					3			52-51 Cream purple moderate plantity w				_			
			C.C.		3										-651
			ડ 5	22, [-										
		\geq		١.				57-60 cream urange	ρυ	ple . C/44					
		/		genel	+-			high plusticity, mos	tle	d net					ICO
			60	Bane)	r -			60-65 red, Crean	< il+	u Clay mulanta					
		\subseteq		V					w						359
		$ \langle $		V	-			,							
					-									\dashv	
			lς					65-67 brown uray	, 4	ram Clay, mod	rsta			\dashv	
								plantity, mottled, we	+						
		$\langle $			_			67-71 bown, reddish	ba	wn, Silty Clay,	_		_	4	C _i z9
	\dashv				-			motted, compact, but			\dashv	-	\dashv	\dashv	
		$\leftarrow \downarrow$			<u></u>		1	744			1	1	L		

*When rock coring, enter rock brokeness.

*When rock coring, enter rock brokeness.

*Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

*Remarks:

Background (ppm):

No

Converted to Well:

_X__

Yes

Well I.D. #:

WELL No.:

DMW-7I

MONITORING WELL SHEET

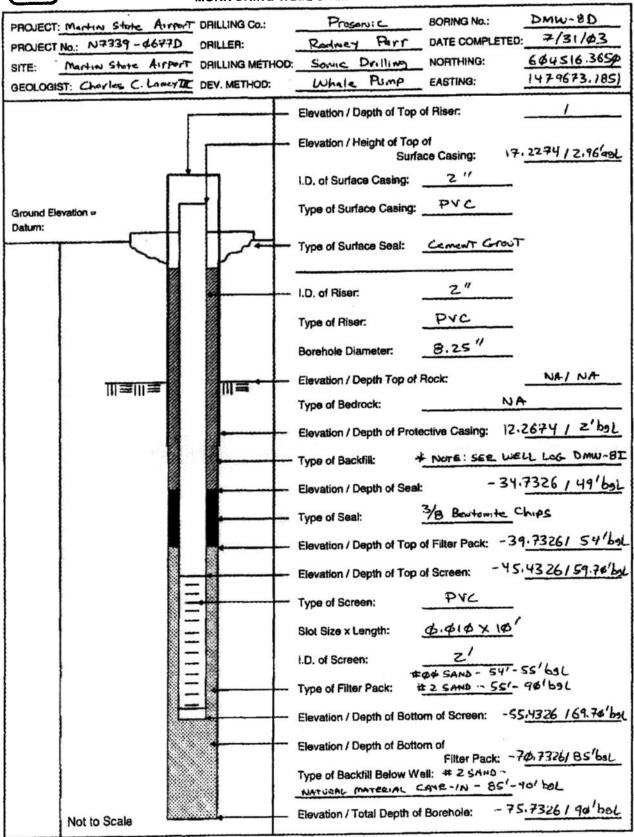
PROJECT: Mertin State Airport DRILLING Co.:	Prosonic BORING No.: DMW-7I
PROJECT No.: N7339- 6677.D DRILLER:	Rodney Parr DATE COMPLETED: 7/29/03
SITE: Martin State Arpart DRILLING METH	
GEOLOGIST: Charles C. LawerIII DEV. METHOD:	Whale Pump EASTING: 147924.1747
	Elevation / Depth of Top of Riser: /
	- Elevation / Height of Top of Surface Casing: 22.9462 / 2.7649L
	I.D. of Surface Casing: 2"
Ground Elevation = Daturn:	Type of Surface Casing: PTC
	Type of Surface Seal: Cement Grout
	I.D. of Riser:
	Type of Riser:
	Borehole Diameter: 8.25"
	- Elevation / Depth Top of Rock: NA / NA
	Type of Bedrock: NA-
·	- Elevation / Depth of Protective Casing: 18.2962 / 2'beL
	Type of Backfill: Cement Grout
	- Elevation / Depth of Seal: -12,7438 / 33'bal
	Type of Seal: 3/8
	- Elevation / Depth of Top of Filter Pack: -18.7438/ 39'beL
	- Elevation / Depth of Top of Screen: -23,8138 / 44.11/bg
	Type of Screen: PVC
	Slot Size x Length: $\phi \cdot \phi \cdot \phi \times \phi'$
	I.D. of Screen:
=	- Type of Filter Pack: #2 SAND - 39'-57.5'69L
NOTE: FOR INFORMATION	Elevation / Depth of Bottom of Screen: -33.8136 / 54.11/bgL
ON MATERIAL BELOW STS! bol, Refer TO MW SHEET FOR DMW-7D	Elevation / Depth of Bottom of Filter Pack: -3 7.4538/ 57.5 bat
Wm ayer leis olines in	Type of Backfill Below Well: # 2 SAND TO S7.5' bol.
Not to Scale	Elevation / Total Depth of Borehole: /



WELL No.:

DMW-8D

MONITORING WELL SHEET



WELL NO .: 10 - 150



OVERBURDEN MONITORING WELL SHEET FLUSH - MOUNT

Tetra Tech NUS, Inc.		2
PROJECT MARIN Conte trigos	LOCATION	DRILLER Bockey PAIN
PROJECT NO.	DODING	DRILLING
DATE BEGUN 1-07-02	DATE COMPLETED 11-12	DRILLING METHOD SOURC 150
FIELD GEOLOGIST Gus NELSON		DEVELOPMENT
GROUND ELEVATION	DATUM	METHOD
8	ELEVATION TOP OF RISER:	
	TYPE OF SURFACE SEAL!	
FLUSH MOUNT SURFACE CASING WITH LOCK	TYPE OF PROTECTIVE CASING:_	
WITH LOCK	I.D. OF PROTECTIVE CASING:	
	DIAMETER OF HOLE:	
	TYPE OF RISER PIPE:	
	RISER PIPE I.D.: 2'	
	TYPE OF BACKFILL/SEAL:	
	TYPE OF SEAL: 3/2 bestwite	56s/
	ELEVATION/DEPTH TOP OF SAND	
	(1) SAG OF 50 NJ.	me
10-1	ELEVATION (DEDT), TOD OF COR	
	ELEVATION/DEPTH TOP OF SCREE	:N: <u>574</u>
(b) // E	TYPE OF SCREEN: SLOT SIZE x LENGTH: #/// X.S	
12 M	TYPE OF SAND PACK: #5	
screen only	DIAMETER OF HOLE IN BEDROCK:	2"
ONY (=	ELEVATION / DEPTH BOTTOM OF	SCREEN: 624
	· · · · · · · · · · · · · · · · · · ·	CAND
	ELEVATION / DEPTH BOTTOM OF HO	
	1	,
	BACKFILL MATERIAL BELOW SAND:	#5 smil
	And 3/8 BENTONIE SEA	/

WELL NO.: 4W-1Ce D



OVERBURDEN MONITORING WELL SHEET

Tetra Tech NUS, Inc.	STICK-OP	
PROJECT WAYN MYDONT PROJECT NO. DATE BEGUN 10-12-07 FIELD GEOLOGIST Gus NO. GROUND FLEVATION	LOCATION_ BORING DATE COMPLETED 10-12-07	DRILLER BENK Roley DRILLING METHOD SONIC DEVELOPMENT
FIELD GEOLOGIST Gus NG. GROUND ELEVATION	DATUM ELEVATION/HEIGHT OF TOP OF ELEVATION/HEIGHT OF TOP OF TYPE OF SURFACE SEAL:	DEVELOPMENT METHOD F SURFACE CASING: F RISER PIPE: L: 47 Results/ft 53
	ELEVATION/DEPTH BOTTOM OF SE BACKFILL MATERIAL BELOW SAND NAME MEDICAL ELEVATION/DEPTH OF HOLE:	AND PACK:

WELL NO.: MW-17D



OVERBURDEN MONITORING WELL SHEET FLUSH - MOUNT

Terra Tech Nus, Inc.	
PROJECT Marin State Area LOCATION BORING	DRILLER BEN
PROJECT NO. DATE BEGUN 10-10-07 FIELD GEOLOGIST GUS NELSON	DRILLING SONIC
GROUND ELEVATION DATUM	DEVELOPMENT METHOD
ELEVATION TOP OF RISER:	
TYPE OF SURFACE SEAL:	
FLUSH MOUNT TYPE OF PROTECTIVE CASING:	
WITH LOCK I.D. OF PROTECTIVE CASING:_	,
DIAMETER OF HOLE:	
TYPE OF RISER PIPF:	
RISER PIPE I.D.:	
TYPE OF BACKFILL/SEAL:	
ELEVATION/DEPTH TOP OF SEA	47,0
TYPE OF SEAL: 3/8 COMS	E Grade BENTANOTO
2 6495 OF	Hole plug used
TYPE OF SEAL: 3/8 COMS HOVE Plug (Sodium) 2 6495 OF ELEVATION/DEPTH TOP OF SANG	57,8
45095 0	f sand used
ELEVATION/DEPTH TOP OF SCRE	EN: 59/8
SLOT SIZE x LENGTH:	sh Thread
TYPE OF SAND PACK: #1	<u>, , , , , , , , , , , , , , , , , , , </u>
TIPE OF SAND PACK: 7	
DIAMETER OF HOLE IN BEDROCK	6"
ELEVATION / DEPTH BOTTOM OF	
ELEVATION / DEPTH BOTTOM OF	SAND: 69/8
BACKFILL MATERIAL BELOW SAND	
silly clay Napra	1 Material

WELL NO.: 4W-18D



OVERBURDEN MONITORING WELL SHEET STICK-UP

Tetra Tech NUS, Inc.		
PROJECT LANTIN State HINK	OCATION	DRILLER ZWINEY
PROJECT NO B	ORING MW-18D	DRILLING
DATE BEGUN //- 8-0 F	ATE COMPLETED 11-8-07	METHOD <u>Jew/</u> C
FIELD GEOLOGIST (ALS NETS)		DEVELOPMENT
GROUND ELEVATION D		METHOD
<u> </u>	FI EVATION (HEIGHT OF TOP OF S	UPEACE CARMO
	ELEVATION/HEIGHT OF TOP OF S	ORFACE CASING:
	ELEVATION/HEIGHT OF TOP OF R	ISER PIPE: /
66/20/20		
	TYPE OF SURFACE SEAL:	

	I.D. OF SURFACE CASING:	
	TYPE OF SURFACE CASING:	WHILE AND ADDRESS
ACAD: FORM_LINESU. day		
9 8	Dioro pine i p	
8 8	RISER PIPE I.D.: TYPE OF RISER PIPE:	
9 9-	BOREHOLE DIAMETER:	
		Manufacture (see a see
	TYPE OF BACKFILL:	
9 9	THE OF BAOKFILL	
3 9	ELEVATION/DEPTH TOP OF SEAL:	61,5
	TYPE OF SEAL: 38 Benton;	te seal
	DEPTH TOP OF SAND PACK:	
	GEPTH TOP OF SAND PACK:	
	ELEVATION (DEDT), TOD OF CORP.	71.5
9 - 9	ELEVATION/DEPTH TOP OF SCREEN	
8 = 8	TYPE OF SCREEN: 480 Flush	Thread
8 = 8	SLOT SIZE x LENGTH: 40 x 10	
3 = 8		
	I.D. OF SCREEN:	
3 = 3		
		l
	TYPE OF SAND PACK: #1	
		21
	- ELEVATION/DEPTH BOTTOM OF SCRE	EN: <u>8410</u>
	- ELEVATION/DEPTH BOTTOM OF SAND	PACK.
	BACKFILL MATERIAL () BELOW SAND:	PACK: <u>67/0</u>
	+1 SANC	
	- ELEVATION/DEPTH OF HOLE:	8416
	, and the state of	=1/9

WELL NO.: <u>MW-19D</u>



OVERBURDEN MONITORING WELL SHEET STICK-UP

Tetra Tech NUS, Inc.

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F	PROJECT / (John Awar	LOCATION	DRILLER Rolle
F	PROJECT NO.	,	BORING	
<u>ַ</u>	DATE BEGUN 70-	19-07	DATE COMPLETED 10-22-02	DRILLING SOUIC
	FIELD GEOLOGIST COROUND ELEVATION	15 140-1501	7	DEVELOPMENT
F	PLOOND CEEANION		DATUM	METHOD
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	•		The state of the state of	SURFACE CASING:
61/26/88			ELEVATION/HEIGHT OF TOP OF	RISER PIPE:
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9			705 05 0105105 05 11	
ACAD: FORM_MWSU.dwg	C.		TYPE OF SURFACE SEAL: COU	CNE
\$	7			
8		1 1 1	I.D. OF SURFACE CASING:	
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٧				
		H H-	RISER PIPE I.D.:	
		9 9	RISER PIPE I.D.: TYPE OF RISER PIPE:	*
			20221012 271112	
			BOREHOLE DIAMETER: 64	
			TYPE OF BACKFILL:	
				63 Denrep
		a a	ELEVATION/DEPTH TOP OF SEAL:	65
		E ST		
			TYPE OF SEAL: 3/8 SONTON, 2 5495 OF 502 4	TC 501/
			DEPTH TOP OF SAND PACK:	at puly was 68
	i		5645 5	
			ELEVATION/DEPTH TOP OF SCREE	N: 70,
	6 8	= 1	A state of the sta	est.
	į	l = 11	TYPE OF SCREEN: 480 Three	<u>u</u>
	ž.		SLOT SIZE x LENGTH: #10x/	7 2
	3			
		= 8	I.D. OF SCREEN: 2"	
	e e			
	8	=	TORE OF SAME PARK HAT	
	Total Control	=	TYPE OF SAND PACK: #2	
	8			
			ELEVATION / DEPTH BOTTOM OF SCI	REEN: <u>\$9</u>
		Z	ELEVATION/DEPTH BOTTOM OF SAI BACKFILL MATERIAL BELOW SAND	ND PACK: 30,
	200		Natural Materia	
			ELEVATION/DEPTH OF HOLE:	8//
			The state of the s	0//

WELL NO .: M/W- 20 D



OVERBURDEN MONITORING WELL SHEET STICK-UP

Tetra Tech NUS, Inc. PROJECT MATRICULTARE Pur LOCATION DRILLER Rocher PART PROJECT NO. **BORING** DRILLING DATE BEGUN 11-6-02 DATE COMPLETED 11-6-0+ METHOD Jay C FIELD GEOLOGIST Gus NElson DEVELOPMENT GROUND ELEVATION DATUM METHOD why/c ELEVATION/HEIGHT OF TOP OF SURFACE CASING:___ ELEVATION/HEIGHT OF TOP OF RISER PIPE: TYPE OF SURFACE SEAL: I.D. OF SURFACE CASING: TYPE OF SURFACE CASING: RISER PIPE I.D.: TYPE OF RISER PIPE: BOREHOLE DIAMETER: -TYPE OF BACKFILL:_ ELEVATION/DEPTH TOP OF SEAL: TYPE OF SEAL: DEPTH TOP OF SAND PACK: ELEVATION/DEPTH TOP OF SCREEN: TYPE OF SCREEN: 480 Flush Thrend SLOT SIZE x LENGTH: 10 x 10 I.D. OF SCREEN: _ 2" TYPE OF SAND PACK: ELEVATION/DEPTH BOTTOM OF SCREEN: 70 ELEVATION/DEPTH BOTTOM OF SAND PACK: BACKFILL MATERIAL BELOW SAND: ELEVATION/DEPTH OF HOLE:

WELL NO.: 10-210



OVERBURDEN MONITORING WELL SHEET STICK-UP

	etta fech NUS, in	• .		
Р	ROJECT MAY IN ST	ate Allow	OCATION	DRILLER Rachey Part
P	ROJECT NO.	7 8	ORING	COLLINA
	ATE BEGUN 10-26	-07 D	ATE COMPLETED 10-26-02	METHOD SON'C
G	IELD GEOLOGIST (34) ROUND ELEVATION_		ATUM	DEVELOPMENT METHOD
Ţ			FLEVATION AFFICUT OF TOP OF	CUREAGE GAGNIG
2	•		ELEVATION/HEIGHT OF TOP OF	SURPACE CASING:
62/20/88		\Box	ELEVATION/HEIGHT OF TOP OF	RISER PIPE:
			TYPE OF SURFACE SEAL:	
ACAD: FORM_MWSU.dwg			I.D. OF SURFACE CASING:	
ACAD: FI			TYPE OF SURFACE CASING:	
	•		RISER PIPE I.D.:	
			RISER PIPE I.D.: 1YPE OF RISER PIPE:	
			BOREHOLE DIAMETER:	
		 	TYPE OF BACKFILL:	
		-	ELEVATION/DEPTH TOP OF SEAL:	411
		-	TYPE OF SEAL: 1/2 Bestwike	
			DEPTH TOP OF SAND PACK:	(68
	\$ 12 E	Paraus	(6) bagu 0550 50	and the state of t
	E .	-	ELEVATION/DEPTH TOP OF SCREE	
	137 137 137	=	TYPE OF SCREEN: 480 Huss	h Thread
		= 3	SLOT SIZE x LENGTH: #10 X	70
			I.D. OF SCREEN: 3"	
	8	=	¥1	
		= 0500	TYPE OF SAND PACK: #1	Marie de Bratania de La Caración de Caraci
		- 8	ELEVATION/DEPTH BOTTOM OF SCI	REEN: <u>89</u>
			- ELEVATION/DEPTH BOTTOM OF SAN BACKFILL, MATERIAL BELOW SAND:	ID PACK: ZO
	e de la companya de l	T.	NAtural material	
	Ÿ		ELEVATION/DEPTH OF HOLE:	83 591

WELL NO.: MW- 28 D



OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT MAN Shope	MACOCATION BORING	DRILLER KOUNCY
DATE BEGUN 10-30-02	DATE COMPLETED 10-20-22-	DRILLING SONIC
FIELD GEOLOGIST / NE	DATUM	DEVELOPMENT METHOD
ACAD: FORM_AWSU.dwg 37/28/99 INL	ELEVATION/HEIGHT OF TOP OF ELEVATION/HEIGHT OF TOP OF TYPE OF SURFACE SEAL: 1.D. OF SURFACE CASING: TYPE OF SURFACE CASING: TYPE OF SURFACE CASING: TYPE OF RISER PIPE: BOREHOLE DIAMETER: TYPE OF BACKFILL: ELEVATION/DEPTH TOP OF SEAL TYPE OF SEAL: JAGO OF SON SON CONTROL ELEVATION/DEPTH TOP OF SCREEN	SURFACE CASING: / RISER PIPE: /
	TYPE OF SCREEN: 480 Flux SLOT SIZE x LENGTH: 10 x 10 I.D. OF SCREEN: 2" TYPE OF SAND PACK: #1 ELEVATION/DEPTH BOTTOM OF SO BACKFILL MATERIAL BELOW SAND:	REEN: 801
	ELEVATION/DEPTH OF HOLE:	83,

WELL NO.: 4W-23D

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT MAN THE ME PROJECT NO. DATE BEGUN 1/- 1-0 7- FIELD GEOLOGIST Away	BORING DRILL DATE COMPLETED (40)	er <u>Kockey</u> Ing 500 <u>Sov</u> 'c
GROUND ELEVATION	DEVEL METHO	OPMENT
47/28/99 INL	ELEVATION/HEIGHT OF TOP OF SURFAI	
1	TYPE OF SURFACE SEAL:	Management of the second of th
ACAD: FORM_AWSU.dwg	I.D. OF SURFACE CASING: TYPE OF SURFACE CASING:	
	RISER PIPE I.D : TYPE OF RISER PIPE:	
	BOREHOLE DIAMETER:	
	TYPE OF BACKFILL:	
	TYPE OF SEAL: 3/8 OF BEN FON SCAL (4) SALS DEPTH TOP OF SAND PACK: 5 645 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	13.2' 76'1
-	ELEVATION/DEPTH TOP OF SCREEN:	761
	SLOT SIZE x LENGTH: 480 Flysh Th	
	I.D. OF SCREEN: 2"	
	TYPE OF SAND PACK: #1	
1-1	ELEVATION/DEPTH BOTTOM OF SCREEN:	861
7	ELEVATION/DEPTH BOTTOM OF SAND PACE BACKFILL MATERIAL BELOW SAND:	<u>861</u> K; <u>861</u>
	ELEVATION/DEPTH OF HOLE:	

WELL NO.: 410-245

FŁ

OVERBURDEN MONITORING WELL SHEET FLUSH - MOUNT

PROJECT <u>/WAN (JA) (E.</u> PROJECT NO.	HYPW LOCATION	DOTE LINE
DATE BEGUN 1/-2-07	DATE COMPLETED 11- 2 -0	DRILLING METHOD DOV
FIELD GEOLOGIST <u>Exict</u> Ale GROUND ELEVATION	DATUM	DEVELOPMENT METHOD
	ELEVATION TOP OF RISE	R:
	TYPE OF SURFACE SEAL.	
FLUSH MOUNT— SURFACE CASING	TYPE OF PROTECTIVE CA	
WITH LOCK	I.D. OF PROTECTIVE CAS	ING:
	DIAMETER OF HOLE:	
	TYPE OF RISER PIPE:	
	RISER PIPE I.D.:	
	TYPE OF BACKFILL/SEAL:	
8	ELEVATION/DEPTH TOP OF	
	TYPE OF SEAL: 3/8 160/	huster sen!
	ELEVATION/DEPTH TOP OF	sand: 13 /
	8 Eng v oic S SANC (nocch	
	ELEVATION/DEPTH TOP OF	SCREEN: Clusty 151
	TYPE OF SCREEN: 40	Thread
	SLOT SIZE x LENGTH: #7	
E	TYPE OF SAND PACK:	11
	DIAMETER OF HOLE IN BED	PROCK: 9"
	ELEVATION / DEPTH BOTTO	OM OF SCREEN: <u>3<!--</u--></u>
	ELEVATION / DEPTH BOTTO	OM OF SAND: 35/
	ELEVATION/DEPTH BOTTOM	
	BACKFILL WATERIAL BELOW	SAND: CALLED

WELL NO .: 4/W - 24 I

OVERBURDEN MONITORING WELL, SHEET FLUSH - MOUNT

	Tetra Tech NUS, Inc.	rush - MOUNT	
	DATE BEGUN 11-2-07 [FIELD GEOLOGIST Gay Medicing]	DATUM	DRILLER ROCKEY PAR DRILLING METHOD SONIC DEVELOPMENT METHOD
N.		ELEVATION TOP OF RISER:	
66/02/10 6		TYPE OF SURFACE SEAL.	
ACAD: FORM_LIWFM.dwg	FLUSH MOUNT—SURFACE CASING WITH LOCK	TYPE OF PROTECTIVE CASING:	
AD: FO	With Lock	I.D. OF PROTECTIVE CASING:	
ş		DIAMETER OF HOLE:	
		TYPE OF RISER PIPE:	***************************************
		RISER PIPE I.D.:	
		TYPE OF BACKFILL/SEAL:	
		TYPE OF SEAL: 38 Dentain	te real
		ELEVATION/DEPTH TOP OF SAND	
		ELEVATION/DEPTH TOP OF SCREETYPE OF SCREEN: 480 Aught SLOT SIZE x LENGTH: 4/0 x 10	Three 351
		TYPE OF SAND PACK: #1	
		DIAMETER OF HOLE IN BEDROCK:	811
		ELEVATION / DEPTH BOTTOM OF	SCREEN: _45/
		ELEVATION / DEPTH BOTTOM OF	SAND: 45/
		BACKFILL MATERIAL BELOW SAND:	LE : <u>987</u>

WELL NO .: 10-260

F

OVERBURDEN MONITORING WELL SHEET STICK-UP

Tetra Tech, NUS, Inc. PROJECT MANIN JAM LOCATION DRILLER ROOM & PROJECT NO. **BORING** DRILLING PATE BEGUN 10-28-02
FIELD GEOLOGIST Gus ME/SON DATE COMPLETED 10 - 25-07-METHOD SONA DEVELOPMENT GROUND ELEVATION DATUM METHOD ELEVATION/HEIGHT OF TOP OF SURFACE CASING:___ 61/29/88 ELEVATION/HEIGHT OF TOP OF RISER PIPE: ACAD: FORM_MWSU.dwg TYPE OF SURFACE SEAL:____ I.D. OF SURFACE CASING: TYPE OF SURFACE CASING: RISER PIPE I.D.: TYPE OF RISER PIPE: BOREHOLE DIAMETER:___ TYPE OF BACKFILL: ELEVATION/DEPTH TOP OF SEAL:

TYPE OF SEAL: 3/8 benton to Se Holo Plus 4856 DEPTH TOP OF SAND PACK: 4 sags of 50 same used ELEVATION/DEPTH TOP OF SCREEN: TYPE OF SCREEN: 480 Fluid Three SLOT SIZE x LENGTH: #10 x LO I.D. OF SCREEN: 2 4 TYPE OF SAND PACK: #1 08, ELEVATION DEPTH BOTTOM OF SCREEN: ELEVATION/DEPTH BOTTOM OF SAND PACK: BACKFILL MATERIAL BELOW SAND: ELEVATION/DEPTH OF HOLE:

WELL NO.: MW-30I



Tetra Tech NUS, inc.

OVERBURDEN MONITORING WELL SHEET FLUSH - MOUNT

DRILLER Del Cunomobam PROJECT Dump Rand Design LOCATION MSA PROJECT NO. 1 DATE BEGUN 109 BORING MIN-DRILLING Roto Sools BORING MW-335,T DATE COMPLETED 8133109 FIELD GEOLOGIST DOWN
GROUND ELEVATION DEVELOPMENT DATUM METHOD ELEVATION TOP OF RISER: TYPE OF SURFACE SEAL: TYPE OF PROTECTIVE CASING: FLUSH MOUNT— SURFACE CASING WITH LOCK I.D. OF PROTECTIVE CASING: See MW-38/S DIAMETER OF HOLE: TYPE OF RISER PIPE: RISER PIPE I.D.: TYPE OF BACKFILL/SEAL: /381 ELEVATION / DEPTH TOP OF SEAL: TYPE OF SEAL: Rentrate Chips ELEVATION/DEPTH TOP OF SAND: ELEVATION/DEPTH TOP OF SCREEN: TYPE OF SCREEN: 3" ID Schedule 40 PVC, wire-wrapped SLOT SIZE x LENGTH: O.OI-IN X 10 FT TYPE OF SAND PACK: Silica Sand TypeI DIAMETER OF HOLE IN BEDROCK: NIA ELEVATION / DEPTH BOTTOM OF SCREEN: ELEVATION / DEPTH BOTTOM OF SAND: ELEVATION/DEPTH BOTTOM OF HOLE: BACKFILL MATERIAL BELOW SAND: BEDT-COITE



OVERBURDEN MONITORING WELL SHEET FLUSH - MOUNT

PROJECT Damp Rand Design. LOCATION MSA.
PROJECT NO. BORING MID-345 T
DATE BEGUN 819109 DATE COMPLETED 8133109 DRILLER Del Woongham DRILLING ROTO FIELD GEOLOGIST DOWN IN OR SIMBIL DEVELOPMENT GROUND ELEVATION DATUM METHOD ELEVATION TOP OF RISER: TYPE OF SURFACE SEAL: TYPE OF PROTECTIVE CASING: FLUSH MOUNT SURFACE CASING WITH LOCK I.D. OF PROTECTIVE CASING: DIAMETER OF HOLE: mw-345 TYPE OF RISER PIPE: RISER PIPE I.D.: TYPE OF BACKFILL/SEAL: ∠40' ELEVATION/DEPTH TOP OF SEAL: TYPE OF SEAL: BENJOOITE Chips \42' ELEVATION / DEPTH TOP OF SAND: ELEVATION/DEPTH TOP OF SCREEN: TYPE OF SCREEN: 311 T.D. Sch. 40 PVC wire-wrapped SLOT SIZE x LENGTH: 0,01-10 X 10-77 TYPE OF SAND PACK: Silica Sand TypeI DIAMETER OF HOLE IN BEDROCK: NA ELEVATION / DEPTH BOTTOM OF SCREEN: ELEVATION / DEPTH BOTTOM OF SAND: ELEVATION/DEPTH BOTTOM OF HOLE: BACKFILL MATERIAL BELOW SAND: BEOTON'TO Chips

* This well is nested with MW-34S

MW-29D

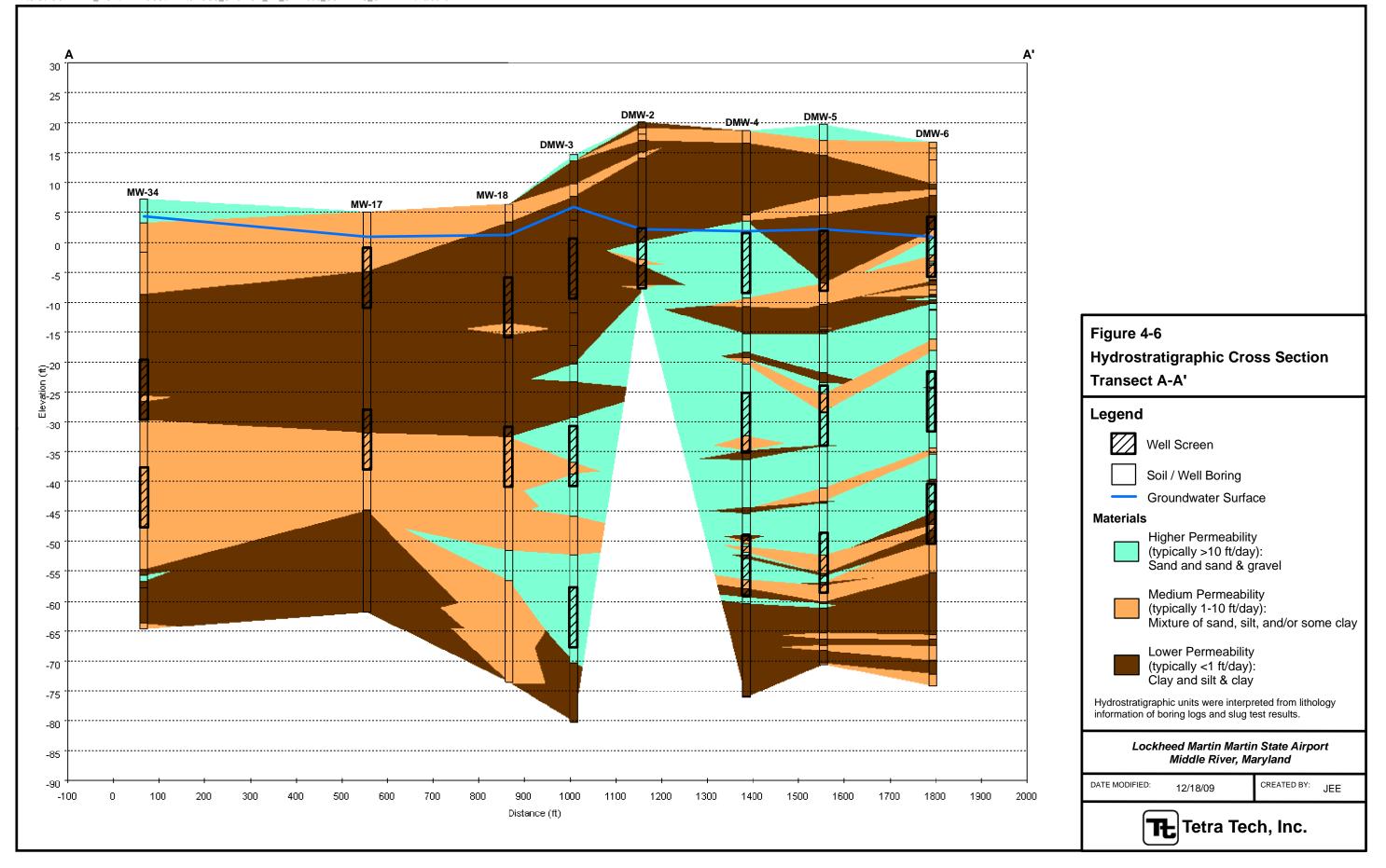
MW-31D

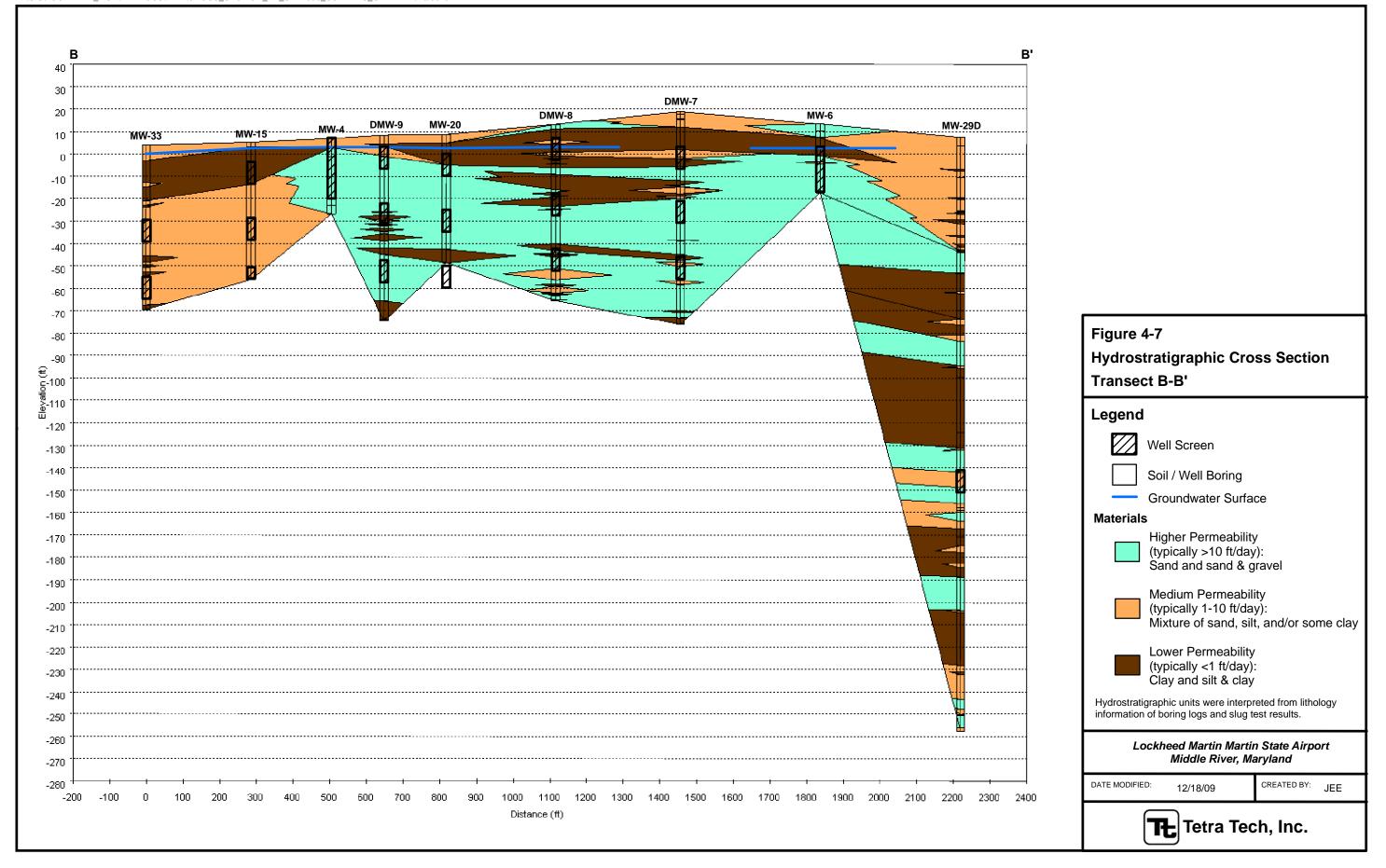
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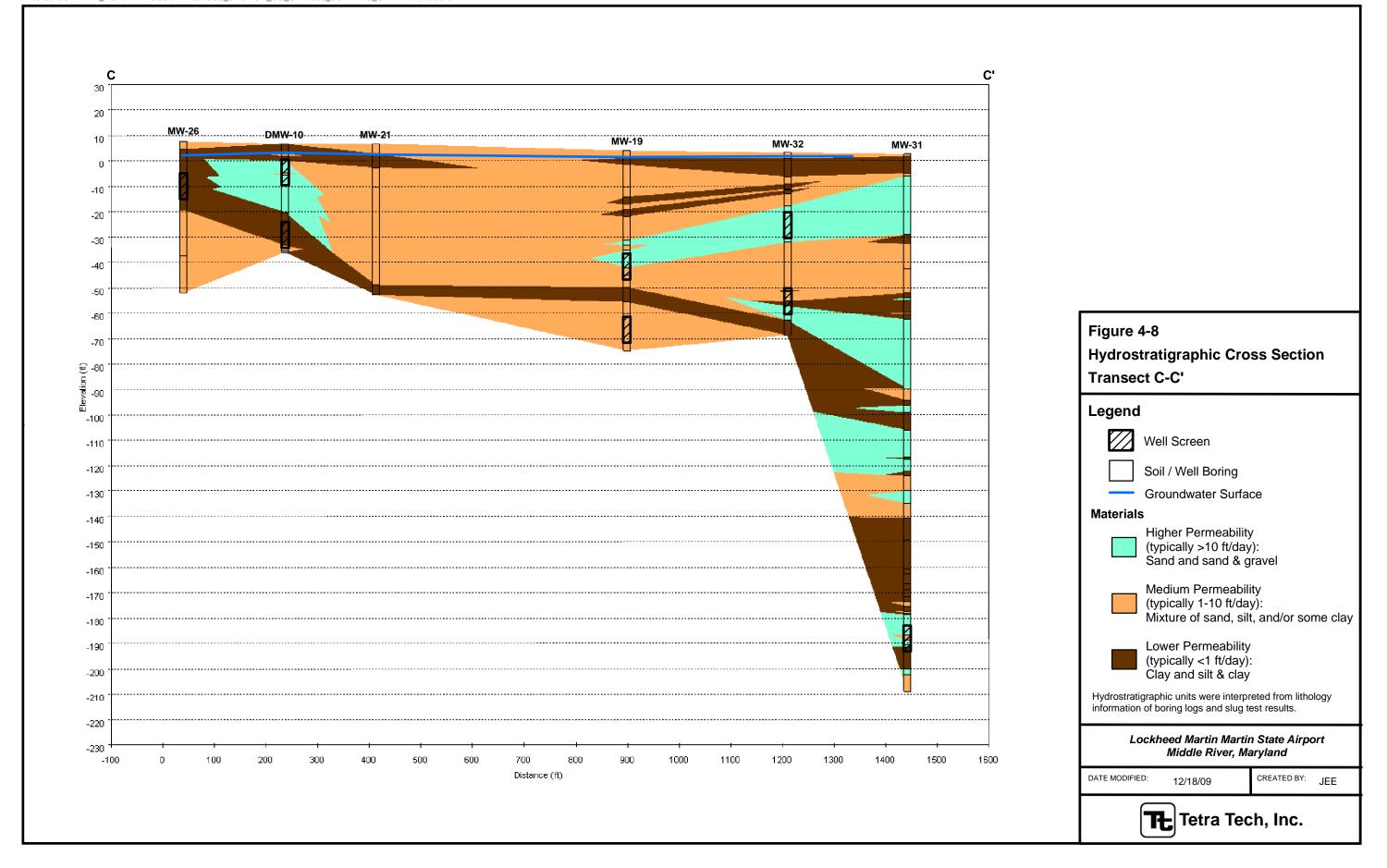
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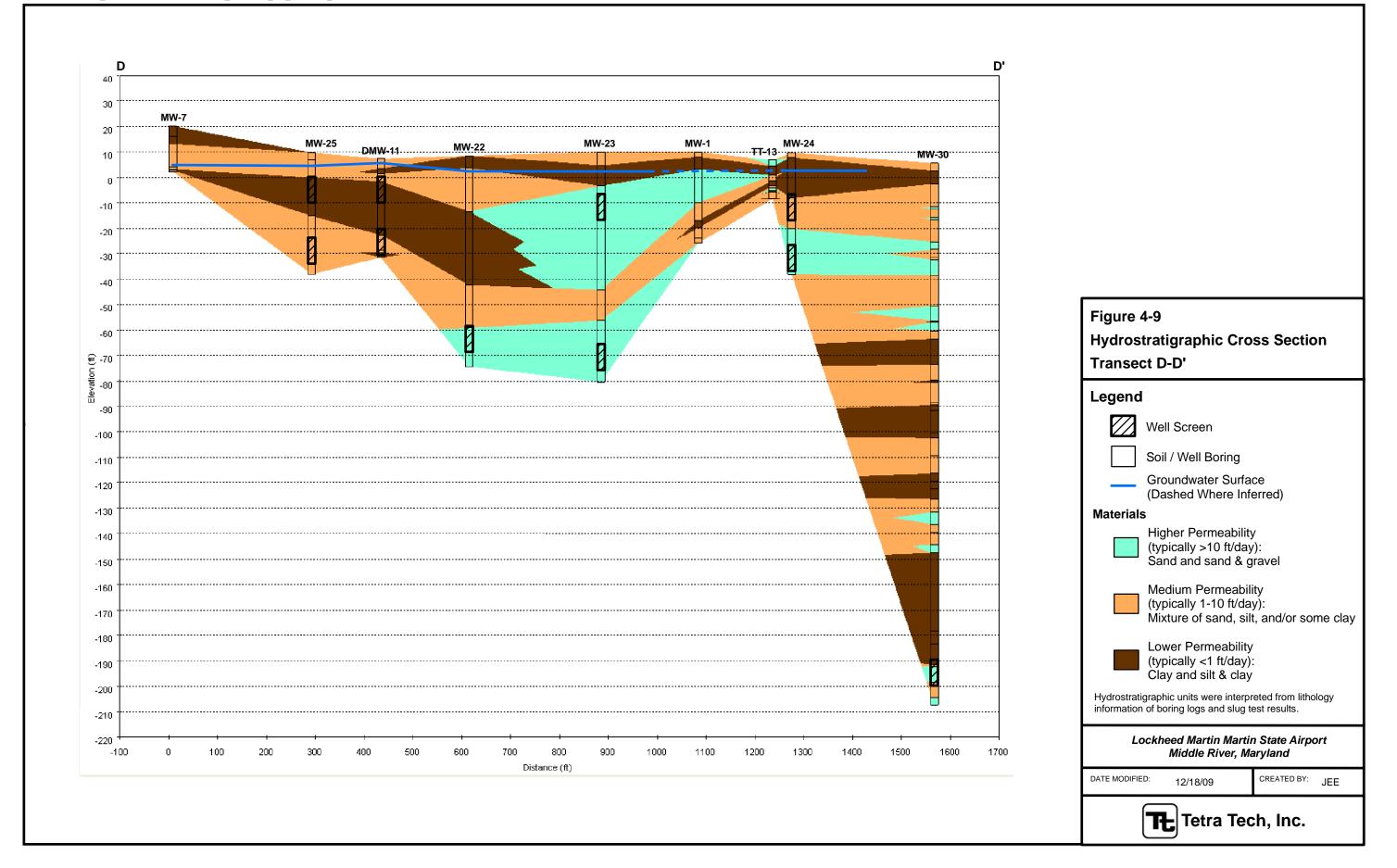
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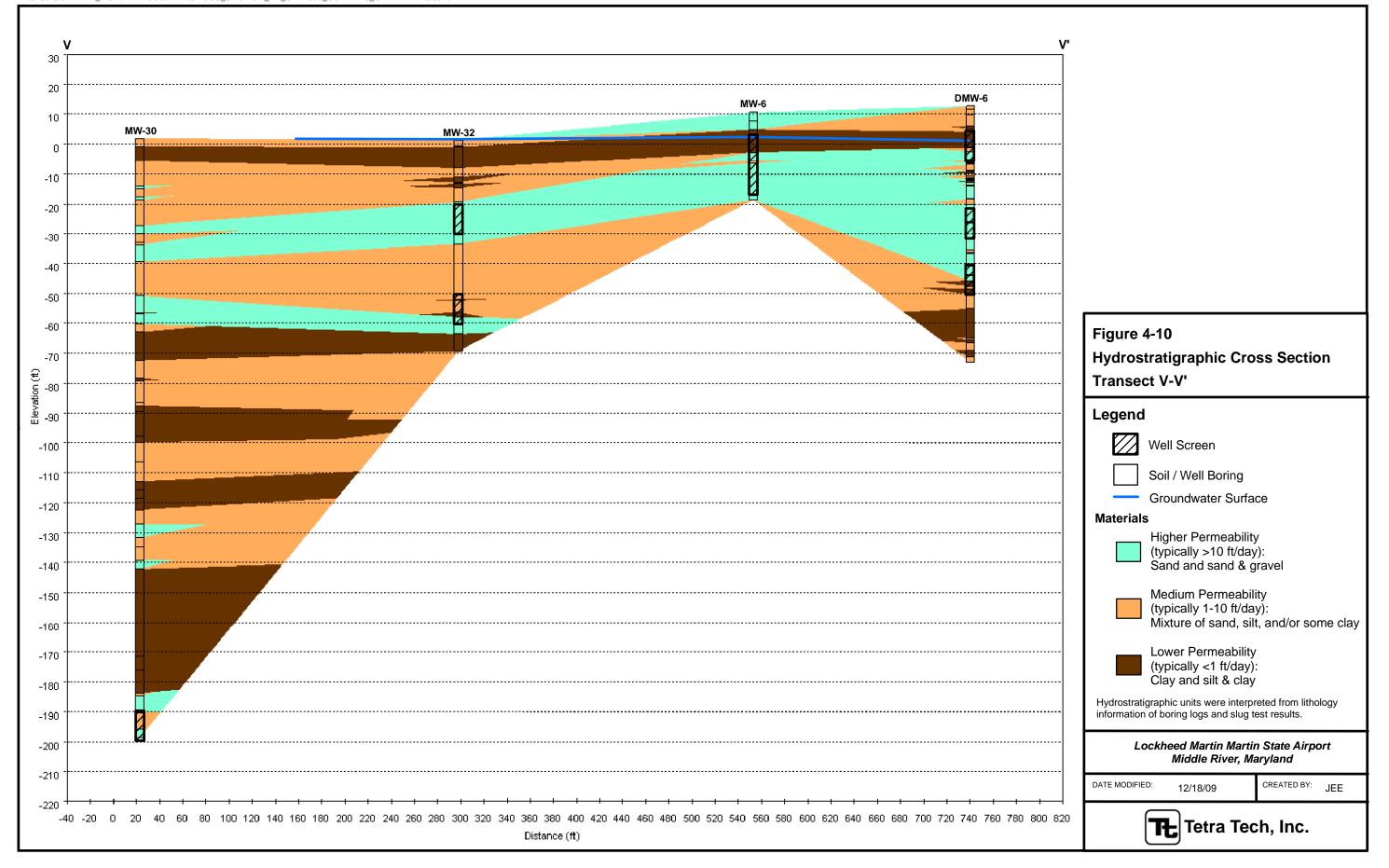
Tetra Tech, Inc.

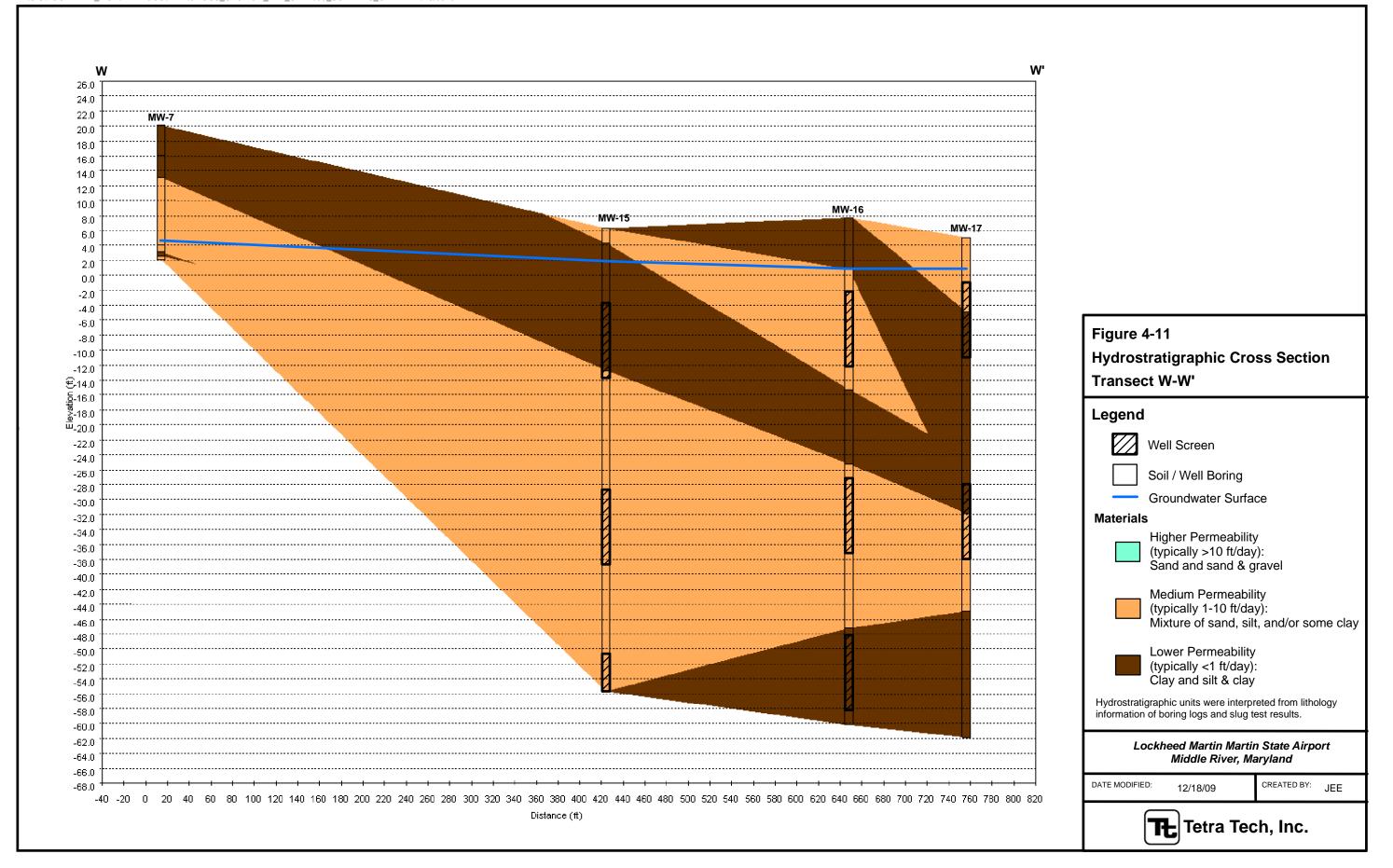


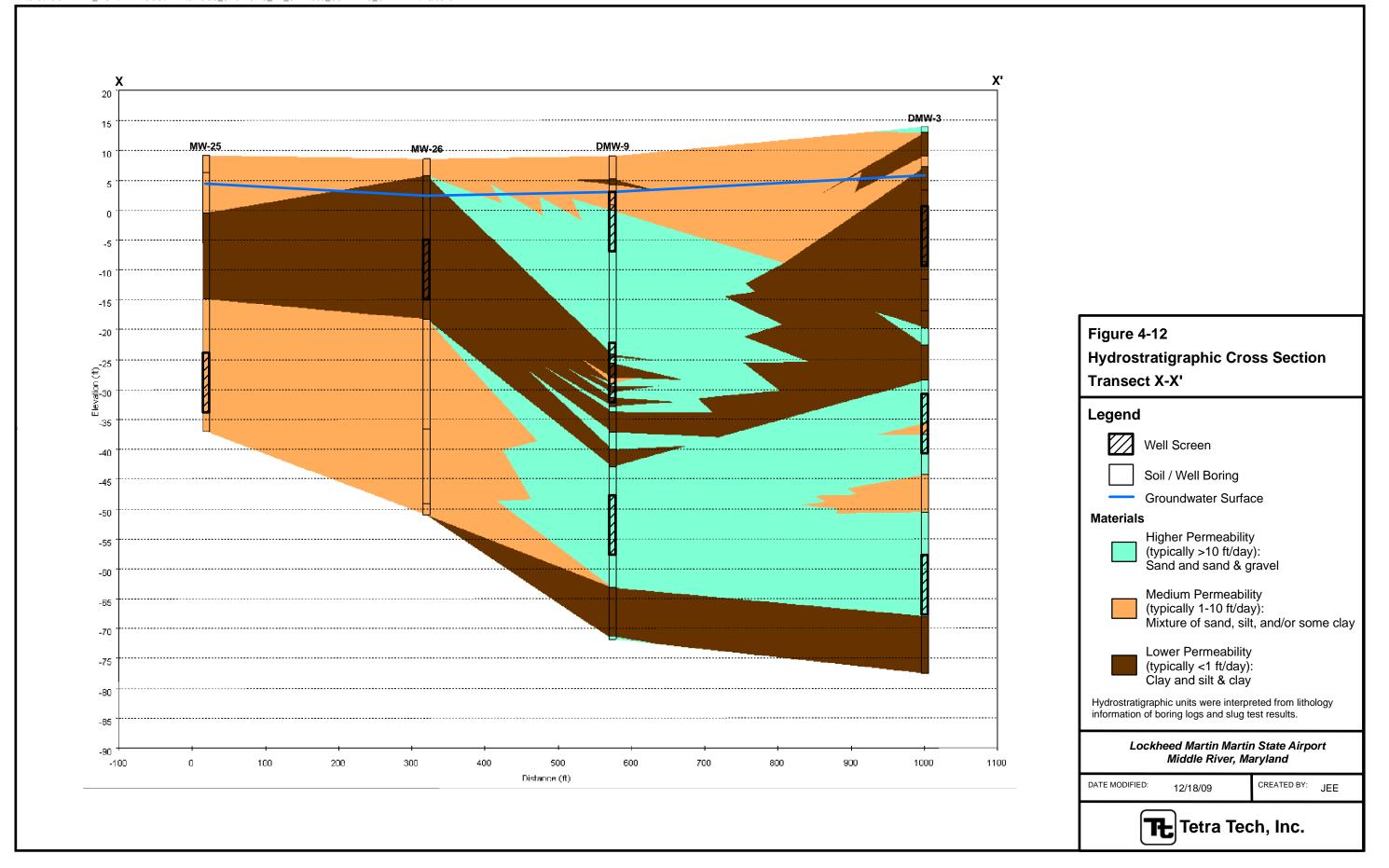


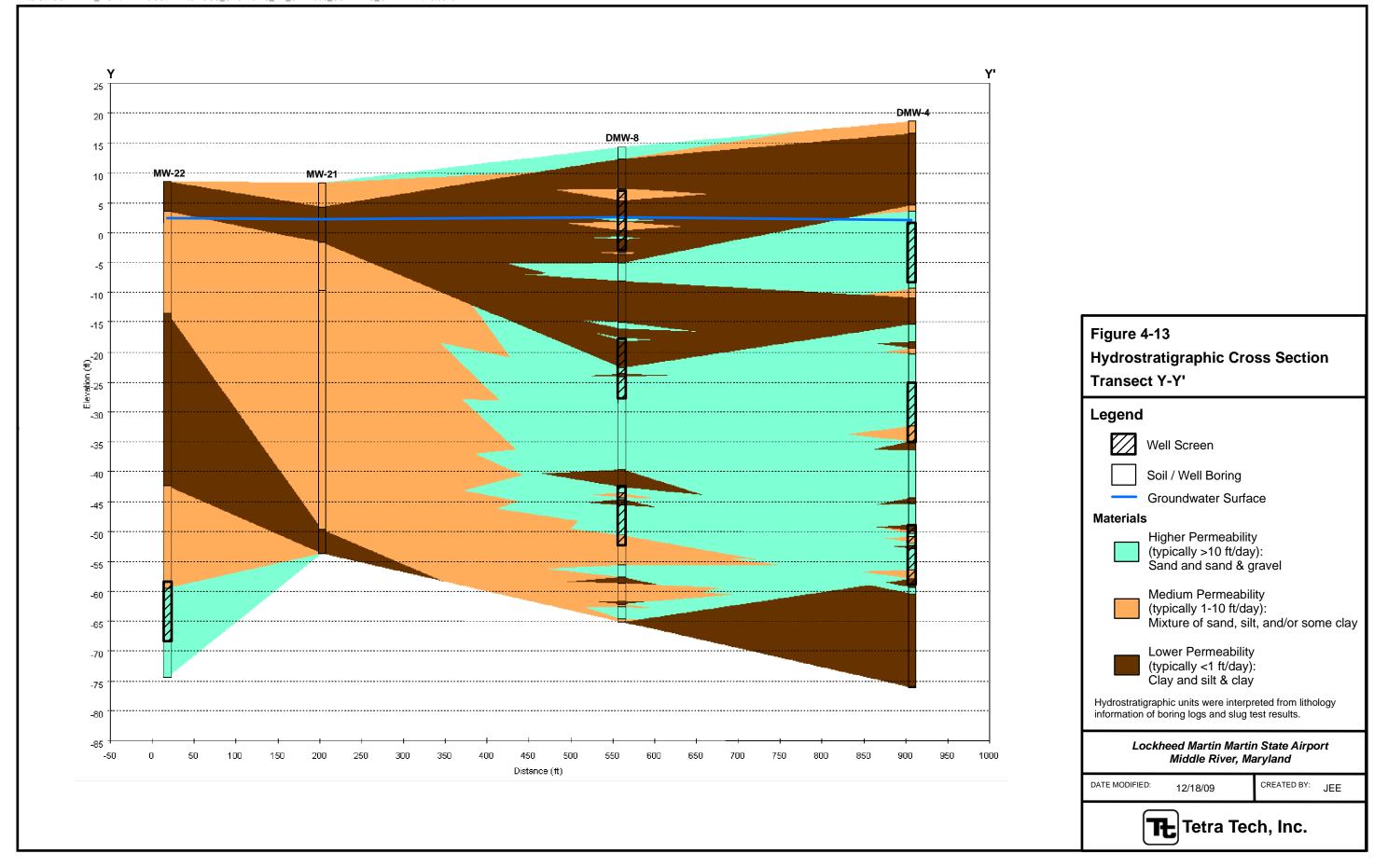












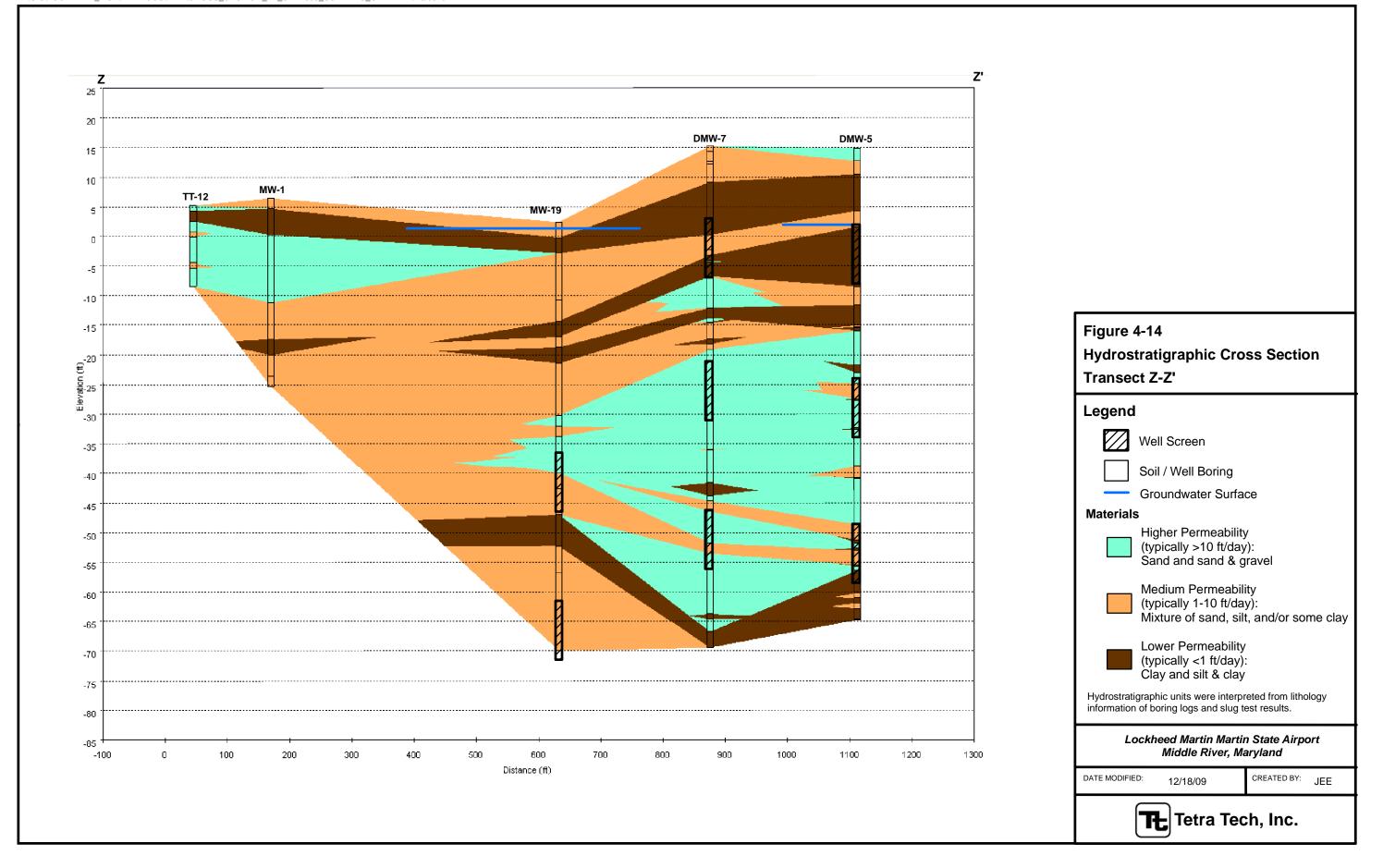


Table D-1

Well Construction Details and Slug Test Pretest Groundwater Levels and Elevations, August 2010

Lockheed Martin Martin State Airport, Middle River, Maryland

Page 1 of 1

Well ID	Aquifer Level	Elevation Ground NAVD88 Feet	Elevation Top of Well Casing NAVD88 Feet	Stickup/ Stickdown Feet	Elevation Screen Midpoint NAVD88 Feet	Casing Diameter Inches	Depth Top of Screen Below Grade Feet	Depth Bottom of Screen Grade Feet	Elevation Top of Screen NAVD88 Feet	Elevation Bottom of Screen NAVD88 Feet	Screen Length Feet	Depth Top of Filterpack Below Grade Feet	Depth Bottom of Fiberpack Below Grade Feet	Filterpack Thickness Feet	Borehole Diameter Inches	Depth to Groundwater Pre-Test Below Top of Casing Feet	Groundwater Elevation Pre-Test NAVD88 Feet
DMW-7I	I	19.22	21.90	2.68	-29.89	2	44.11	54.11	-24.89	-34.89	10	39.0	57.5	18.5	8.25	21.01	0.89
DMW-8D	D	13.62	16.35	2.73	-51.08	2	59.70	69.70	-46.08	-56.08	10	54.0	85.0	31.0	8.25	15.00	1.35
MW-14D	DD	11.95	11.56	-0.39	-101.05	2	108.00	118.00	-96.05	-106.05	10	106.0	118.0	12.0	10.00	7.73	3.83
MW-15D	D	6.29	8.77	2.48	-53.21	2	57.00	62.00	-50.71	-55.71	5	54.0	68.0	14.0	10.00	7.12	1.65
MW-16D	D	7.81	10.22	2.41	-53.19	2	56.00	66.00	-48.19	-58.19	10	53.0	68.0	15.0	10.00	8.73	1.49
MW-17D	D	8.03	7.56	-0.47	-56.97	2	60.00	70.00	-51.97	-61.97	10	57.0	71.0	14.0	10.00	6.36	1.20
MW-18D	D	9.17	8.88	-0.29	-69.83	2	74.00	84.00	-64.83	-74.83	10	71.5	84.6	13.1	10.00	7.85	1.03
MW-19D	D	8.45	7.94	-0.51	-66.55	2	70.00	80.00	-61.55	-71.55	10	68.0	81.0	13.0	10.00	6.76	1.18
MW-20D	D	9.91	12.40	2.49	-55.09	2	60.00	70.00	-50.09	-60.09	10	58.0	71.0	13.0	10.00	10.95	1.45
MW-21D	D	11.31	10.78	-0.53	-63.69	2	70.00	80.00	-58.69	-68.69	10	68.0	83.0	15.0	10.00	9.29	1.49
MW-22D	D	11.49	11.02	-0.47	-63.51	2	70.00	80.00	-58.51	-68.51	10	68.0	83.0	15.0	10.00	9.50	1.52
MW-23D	D	10.34	10.03	-0.31	-70.66	2	76.00	86.00	-65.66	-75.66	10	73.0	88.0	15.0	10.00	8.65	1.38
MW-24I	I	8.24	7.68	-0.56	-31.76	2	35.00	45.00	-26.76	-36.76	10	33.0	48.0	15.0	10.00	5.96	1.72
MW-24S	S	8.24	7.72	-0.52	-11.76	2	15.00	25.00	-6.76	-16.76	10	13.0	27.0	14.0	10.00	5.00	2.72
MW-26D	D	12.04	11.66	-0.38	-50.96	2	58.00	68.00	-45.96	-55.96	10	56.0	68.0	12.0	10.00	10.05	1.61
MW-32I	I	7.45	7.28	-0.17	-52.55	2	55.00	65.00	-47.55	-57.55	10	52.0	68.0	16.0	7.00	6.13	1.15
MW-34I	I	7.51	7.37	-0.14	-42.49	2	45.00	55.00	-37.49	-47.49	10	42.0	58.0	16.0	7.00	5.61	1.76
S – Unner sur	Figial aquifa	**															

S = Upper surficial aquifer

I = Intermediate surficial aquifer

D = Lower surficial aquifer

DD = Deep confined aquifer or below lower surficial aquifer

NAVD88 = North American Vertical Datum of 1988.

APPENDIX E—GEOPHYSICAL SURVEY REPORT



Final Report
21-Acre Dumping Area Detection/Delineation
Dump Road Supplemental Investigation
Martin State Airport
Middle River, MD
Enviroscan Project Number 071017

Prepared for: Tetra Tech NUS, Inc. Prepared By: Enviroscan, Inc. September 17, 2010







September 17, 2010

Mr. Dev Murali **Tetra Tech NUS, Inc.** 20251 Century Boulevard Suite 200 Germantown, MD 20874-7114

RE: Geophysical Survey

Geophysical Survey – 21-Acre Dumping Area Detection/Delineation

Dump Road Supplemental Investigation

Martin State Airport Middle River, MD

Enviroscan Project Number 071017

Dear Mr. Murali:

Pursuant to our proposal dated July 27, 2010, Enviroscan, Inc. (Enviroscan) has completed a geophysical survey of the above-referenced site. The survey consisted of a reconnaissance-level electromagnetic (EM) survey. The methods and results of the survey are described below.

Survey Purpose and Site Description

The primary purpose of the survey was to detect and delineate the horizontal boundaries of reported landfill areas using electromagnetics (EM) beneath the southern end of Taxiway Tango at Martin State Airport, Middle River, Maryland. The survey extends the southern boundary of a previous EM survey performed in November of 2007 (see Enviroscan Project Reference Number 090710).

The Southern Taxiway Tango survey area surface conditions consisted mainly of low-cut grass near the taxiway, variable-sized patches of phragmites, scrub brush, and moderately wooded sections. Figures 1 shows the data coverage of EM survey of the Sothern Taxiway Tango survey area. Inaccessible areas are noted with a green-square hatched pattern.





Mr. Murali September 17, 2010 Page 2

Survey Methods

ΕM

Enviroscan performed EM mapping of the site using a Geonics EM-31MK2 instrument. The EM-31MK2 was selected since (as described below) it is sensitive to buried metal, but is also sensitive to minor changes in the electrical conductivity of subsurface materials in the absence of metal (i.e. due to non-metallic debris and/or anomalous ionic content of any soil moisture).

The EM-31MK2 employs an electromagnetic transmitter coil to induce an electric current in the earth. This current creates a secondary electromagnetic field that is measured by a receiver coil at a fixed separation of 3.7 meters from the transmitter coil. The secondary electromagnetic field has two components: the quadrature component, which is proportional to the bulk electrical conductivity or terrain conductivity (in millimhos per meter or mmho/m) of the subsurface materials, and the inphase component (in parts per thousand or ppt), which is primarily a measure of the relative concentration of metallic material in the subsurface. Note that in the presence of extremely high terrain conductivity material, the dynamic range of the EM-31MK2 can be exceeded (or "saturated"), and the instrument will register spurious negative conductivities (a physical impossibility). These negative conductivities therefore actually represent very high positive conductivities. Similar saturation in the presence of significant metal can cause a spurious negative inphase response that should also be interpreted as a very high positive value.

For this survey, Enviroscan employed an EM-31MK2 in vertical dipole mode. The effective survey depth of the EM-31MK2 is depicted in Appendix A. The instrument is almost completely insensitive to material at the ground surface, and has a peak sensitivity to material at a depth of approximately five feet (see incremental sensitivity curve in Appendix A). Below five feet, the sensitivity diminishes approximately logarithmically. The cumulative effect of this varying sensitivity is also depicted in Appendix A. As the cumulative sensitivity curve shows, approximately 80 percent of the signal originates at depths less than 25 feet. Therefore, the terrain conductivity or inphase response measured by the EM-31MK2 in vertical dipole mode represents primarily subsurface electrical properties at a depth of five feet (plus or minus), with little contribution from material at the ground surface, and moderate (and diminishing) contribution from materials down to approximately 25 feet. The vertical dipole EM-31MK2 was selected to screen out the potentially time-varying effects of surficial variations in ground cover (noted above), while maintaining a significant effective survey depth.

The EM survey was completed by collecting vertical dipole mode terrain conductivity and inphase data along profiles spaced approximately 10-20 feet apart. Along survey profiles, measurement stations were defined by automatically triggering matching inphase and conductivity readings at half-second intervals as the instrument was hand-carried or vehicle

ENVIROSCAN, INC.

Mr. Murali September 17, 2010 Page 3

towed.

The actual location of each measurement station was digitally recorded using a backpack-mounted Topcon GMS-110 global positioning system (GPS) receiver. The EM stations are depicted as tiny crosses in Figure 1. Please note that in the wooded areas the GPS coverage was at times inconsistent, such that full coverage in those areas was not possible.

The EM inphase and terrain conductivity data were contoured using minimum curvature gridding routines in Geosoft Oasis Montaj TM. The inphase response and terrain conductivity color contours are depicted in Figures 2 and 3, respectively. The inphase contour levels are presented as shades of green to red for increasing positive values and green to blue for increasingly negative values (the equivalent of very high positive values — see above). The conductivity contour levels are presented as shades of green to yellow to orange to red to pink for increasing positive values and green to blue for increasingly negative values (the equivalent of very high positive values — see above).

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Results

ΕM

The EM survey results are depicted in Figures 2 and 3, showing the inphase and terrain conductivity results, respectively. The inphase and terrain conductivity data were inspected to identify areas most likely to contain landfill material.

The inphase data were examined for large aerially extensive anomalies that fall above 2 ppt and below -2 ppt, indicating the presence of subsurface metal. No anomalies were delineated with the characteristics of metallic landfill material. One such anomaly, labeled D in Figure 2, was delineated. Anomaly D is associated with a brackish tidal wetland rich in wet mineralized soils. It is common for such soils to cause an inphase anomaly without the presence of metal; however, to confirm this, a test pit should be excavated within the anomaly to identify the source material. Several suspected metallic utilities were delineated and are also noted in Figure 2. One small area in the northwest end of the survey area was found to have metallic surface debris scattered across the ground, including tires, metal cabinets, etc. The inphase anomaly associated with this debris is noted in Figure 2 (Surface Metallic Debris). Enviroscan recommends that the material be removed and the soil below this area be investigated to determine if there is buried material underneath the surface debris.

The contoured terrain conductivity data, depicted in Figure 3, were then examined to identify anomalies that may result from nonmetallic landfill debris. Nonmetallic landfill debris is often identified by the difference between the lower background conductivity of the surrounding native soils and the higher conductivity of the debris; however, the native soils on this site are rich in clay minerals, resulting in a very high background conductivity. The difference between the two may be small and therefore hard to determine. Enviroscan suggests a limited test pit survey to determine the source material of several of the types of terrain conductivity anomalies to better determine which type of anomaly may result from landfill debris. The terrain conductivity anomaly types are:

- Terrain Conductivity Anomaly Type A (see Figure 3) is a discrete, high-amplitude anomaly with clearly defined edges. It is in close proximity to a suspected utility and may be associated with that utility, such as a concrete access vault. This anomaly was subsequently scanned with a hand-held TW-6 metal detector. No metal is associated with this anomaly.
- *Terrain Conductivity Anomaly Type B* is a broad, moderate-amplitude anomaly with edges that fade into the surrounding low-amplitude material. This anomaly may result from higher conductivity soil containing more clay minerals than the soils around it. This anomaly was subsequently scanned with

ENVIROSCAN, INC.

Mr. Murali September 17, 2010 Page 5

a hand-held TW-6 metal detector. No metal is associated with this anomaly.

- Terrain Conductivity Anomaly Type C is a broad, high-amplitude anomaly type with edges that fade into the surrounding moderate-amplitude material. As with Anomaly Type B, this anomaly may result from higher conductivity soil containing more clay minerals than the soils around it. This anomaly was subsequently scanned with a hand-held TW-6 metal detector. No metal is associated with this anomaly.
- Terrain Conductivity Anomaly Type D is a high-amplitude anomaly associated with a tidal wetland. It is very common for brackish wetlands with wet mineralized soils to have high conductivities. As noted above, this area should have a test pit to confirm the source material

Mr. Murali September 17, 2010 Page 6

Limitations

The geophysical survey described above was completed using standard and/or routinely accepted practices of the geophysical industry and equipment representing the best available technology. Enviroscan does not accept responsibility for survey limitations due to inherent technological limitations or site-specific conditions. However, we make every effort to identify and notify the client of such limitations or conditions.

We have appreciated this opportunity to have worked with you. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

Enviroscan, Inc.

William E. Steinhart III, M.Sc., P.G. Senior Geophysics Project Manager

Technical Review By:

Enviroscan, Inc.

Felicia Kegel Bechtel, M.Sc., P.G. President

enc.: Figure 1: EM-31MK2 Survey Data Coverage

Figure 2: EM-31MK2 Inphase Response Contours

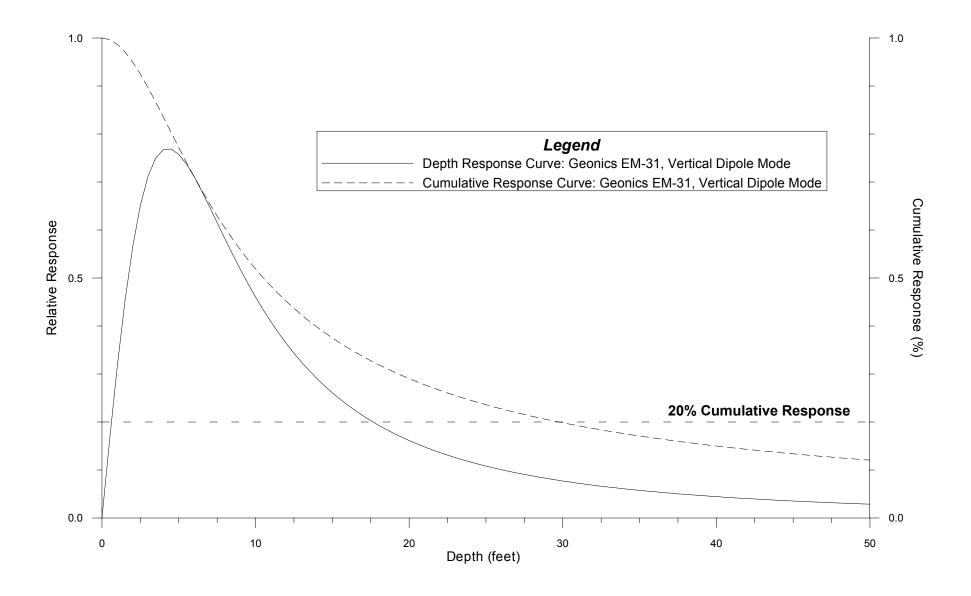
Figure 3: EM-31MK2 Terrain Conductivity Response Contours Appendix A: EM-31 Vertical Dipole Mode Depth Response

Appendix A

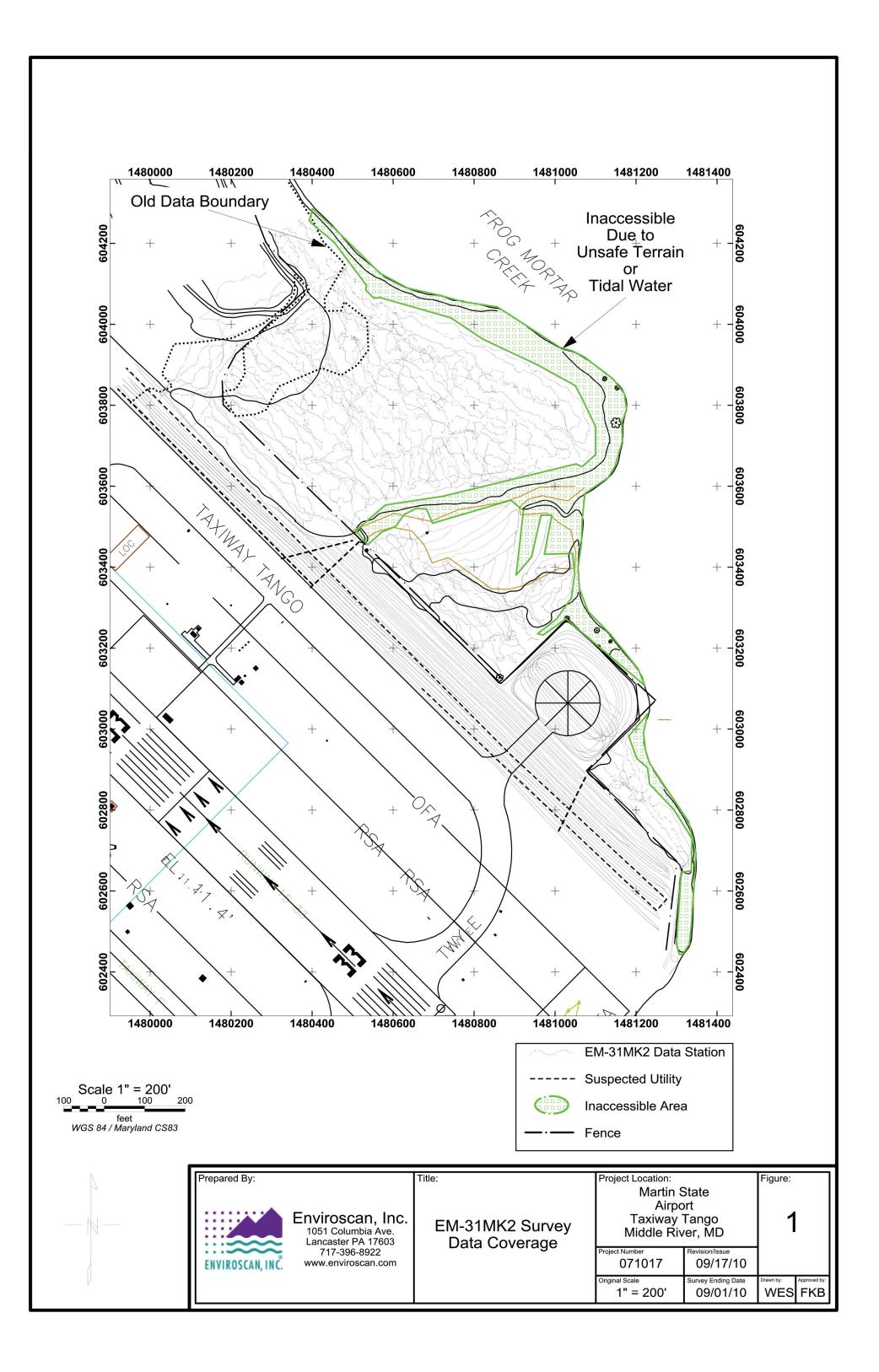
EM-31 Vertical Dipole Mode Depth Response

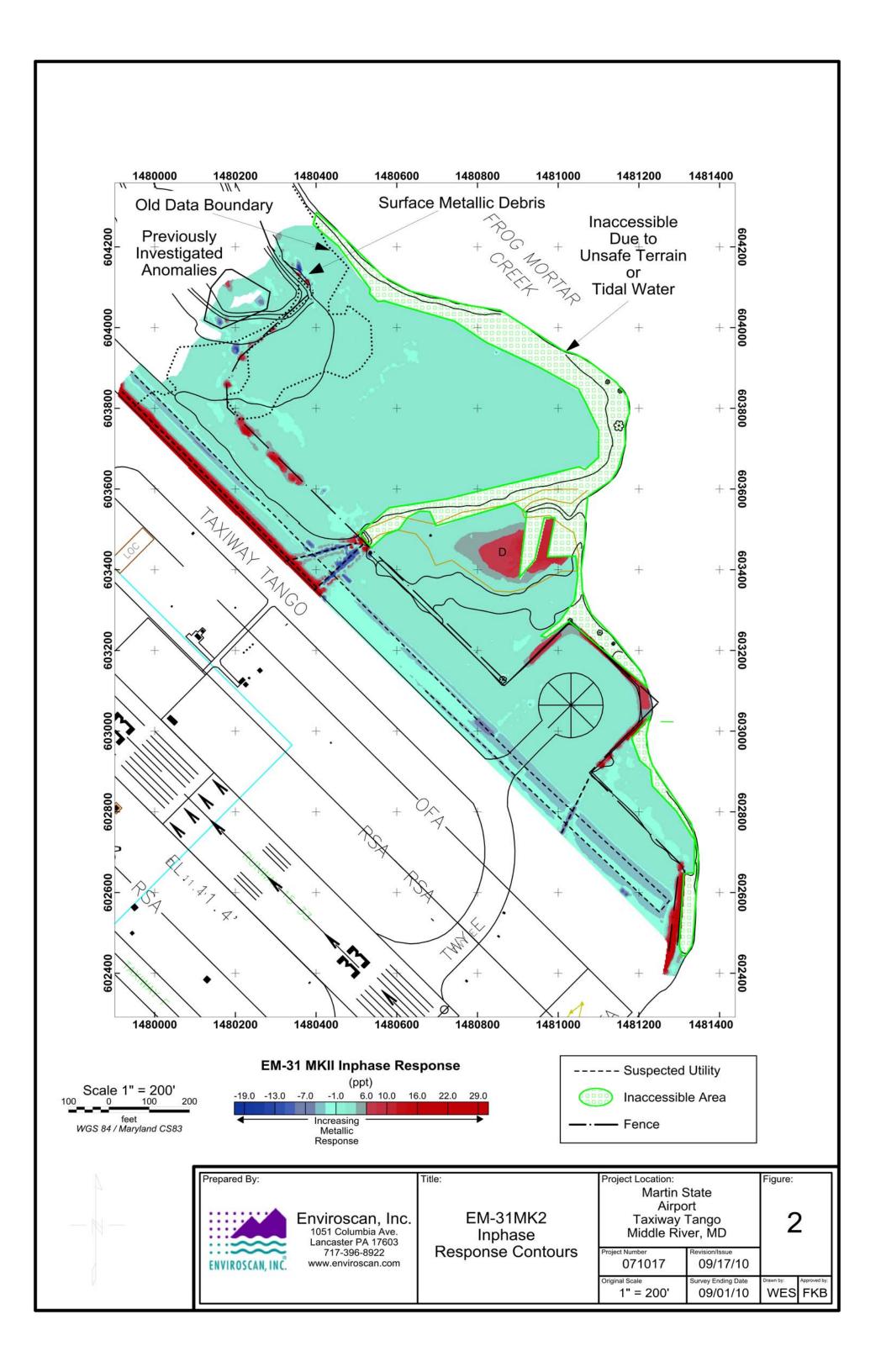


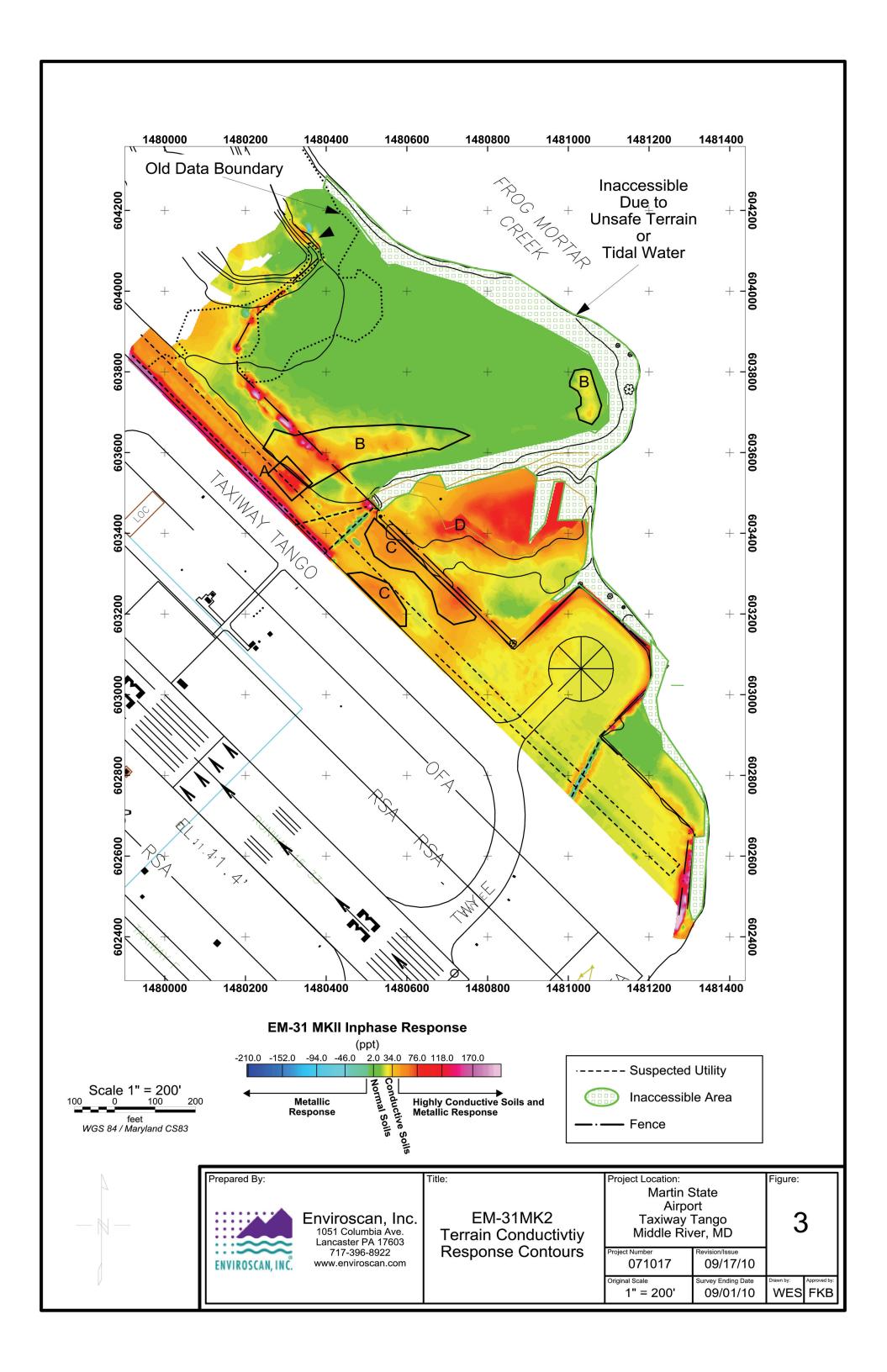












APPENDIX F—SYNOPTIC GROUNDWATER LEVEL DATA	

Table F-1

Groundwater Levels and Elevations - July 2010

Lockheed Martin, Martin State Airport, Middle River, Maryland
Page 1 of 3

		Well	Well	Top of Well	Depth	Groundwater
		Location	Location	Casing	to Groundwater	Elevation
		Northing (Y)	Easting (X)	Elevation	7/2/2010	7/2/2010
	Aquifer	Feet	Feet	Feet	Feet	Feet
Well ID	Level	(NAD 1983)	(NAD 1983)	(NAVD 1988; 2010 Survey)	(Below Top of Casing)	(NAVD, 1988)
DMW-1S	S	604458.58	1479310.48	11.08	9.22	1.86
DMW-2S	S	604670.41	1479807.55	21.75	21.29	0.46
DMW-3S	S	604804.87	1479733.91	16.52	10.86	5.66
DMW-4S	S	604563.04	1480036.27	20.52	20.29	0.23
DMW-5S	S	604430.05	1479906.80	21.34	20.99	0.35
DMW-6S	S	604190.48	1480255.05	18.62	18.39	0.23
DMW-7S	S	604291.49	1479921.81	21.84	NM	ı
DMW-8S	S	604517.05	1479667.61	16.27	12.60	3.67
DMW-9S	S	604771.56	1479286.86	11.45	9.85	1.60
MW-10S	S	604636.82	1479225.83	10.29	8.39	1.90
MW-11S	S	604424.24	1478934.92	9.20	5.69	3.51
MW-15S	S	605010.96	1479028.29	8.60	7.22	1.38
MW-16S	S	605086.42	1479248.84	10.20	9.73	0.47
MW-17S	S	605112.67	1479358.32	7.61	7.16	0.45
MW-18S	S	604930.77	1479645.06	8.89	8.56	0.33
MW-20S	S	604630.96	1479397.95	12.44	10.89	1.55
MW-23S	S	604237.13	1479295.12	10.01	8.29	1.72
MW-24S	S	603945.66	1479375.24	7.72	4.81	2.91
MW-25S	S	604510.08	1478812.44	9.69	6.23	3.46
MW-26S	S	604726.41	1479035.39	11.72	9.47	2.25
MW-32S	S	603917.70	1479926.52	7.27	6.31	0.96
MW-33S	S	605115.62	1478762.02	9.97	7.84	2.13
MW-34S	S	605340.11	1478893.75	7.44	5.77	1.67
MW-3	S	604448.84	1479107.23	11.19	9.21	1.98
MW-4	S	604852.91	1479180.81	10.34	8.59	1.75
MW-5	S	604294.68	1479901.86	22.65	21.77	0.88
MW-6	S	604009.26	1480184.72	15.72	15.14	0.58
MW-7	S	604765.23	1478680.36	10.90	7.36	3.54
OW1-S	S	604674.88	1479817.31	19.17	18.57	0.60
RW1-S	S	604677.60	1479813.40	19.09	18.45	0.64

Table F-1

Groundwater Levels and Elevations - July 2010

Lockheed Martin, Martin State Airport, Middle River, Maryland
Page 2 of 3

		Well Location Northing (Y)	Well Location Easting (X)	Top of Well Casing Elevation	Depth to Groundwater 7/2/2010	Groundwater Elevation 7/2/2010
MAZ-II IB	Aquifer	Feet	Feet	Feet	Feet	Feet
Well ID	Level	(NAD 1983)	(NAD 1983)	(NAVD 1988; 2010 Survey)	(Below Top of Casing)	(NAVD, 1988)
DMW-1A	1 -	604398.60	1479498.32	12.05	10.45	1.60
MW-2	I -	604144.32	1479708.26	8.40	7.46	0.94
DMW-2A	I	604678.82	1479789.39	21.65	21.25	0.40
DMW-3I	I	604810.48	1479731.13	16.45	15.95	0.50
DMW-4I	I	604566.00	1480031.48	20.48	20.03	0.45
DMW-5I	I	604431.10	1479902.80	21.39	21.03	0.36
DMW-6I	I	604193.59	1480266.19	18.64	18.26	0.38
DMW-7I	I	604287.20	1479924.19	21.90	21.32	0.58
DMW-8I	I	604516.35	1479673.28	16.17	15.47	0.70
DMW-9I	I	604764.91	1479293.42	11.40	9.92	1.48
MW-1 ⁽¹⁾	I	604052.58	1479214.74	11.08	NM	
MW-10I	I	604630.69	1479217.34	10.27	8.56	1.71
MW-11I	I				7.29	
MW-14I	I	605129.85	1479550.68	11.72	11.29	0.43
MW-15I	I	605010.96	1479028.29	8.79	7.19	1.60
MW-16I	I	605086.42	1479248.84	10.06	8.66	1.40
MW-17I	I	605112.67	1479358.32	7.68	6.51	1.17
MW-18I	I	604930.77	1479645.06	8.91	8.62	0.29
MW-19I	I	604152.70	1479701.18	7.90	7.17	0.73
MW-20I	I	604630.96	1479397.95	12.39	10.82	1.57
MW-21I	I	604467.75	1479303.22	10.83	9.21	1.62
MW-22I	I	604442.07	1479112.84	11.01	9.12	1.89
MW-23I	I	604237.13	1479295.12	10.07	8.37	1.70
MW-24I	I	603945.66	1479375.24	7.68	5.96	1.72
MW-25I	I	604510.08	1478812.44	9.72	7.83	1.89
MW-26I	I	604726.41	1479035.39	11.67	9.98	1.69
MW-28I	I	605110.61	1479027.89	8.65	7.18	1.47
MW-32I	I	603917.70	1479926.52	7.28	6.4	0.88
MW-33I	I	605115.62	1478762.02	10.02	7.94	2.08
MW-34I	ī	605340.11	1478893.75	7.37	5.72	1.65

Groundwater Levels and Elevations - July 2010 Lockheed Martin, Martin State Airport, Middle River, Maryland Page 3 of 3

Table F-1

Well ID	Aquifer Level	Well Location Northing (Y) Feet (NAD 1983)	Well Location Easting (X) Feet (NAD 1983)	Top of Well Casing Elevation Feet (NAVD 1988; 2010 Survey)	Depth to Groundwater 7/2/2010 Feet (Below Top of Casing)	Groundwater Elevation 7/2/2010 Feet (NAVD, 1988)
OW1-I	I	604638.04	1479781.43	18.04	17.73	0.31
RW1-I	I	604662.81	1479782.43	18.44	18.11	0.33
DMW-1B	D	604398.60	1479498.32	12.04	10.71	1.33
DMW-2B	D	604678.82	1479789.39	21.66	21.04	0.62
DMW-3D	D	604810.48	1479731.13	16.46	15.96	0.50
DMW-4D	D	604566.00	1480031.48	20.44	20.06	0.38
DMW-5D	D	604431.10	1479902.80	21.38	21.00	0.38
DMW-6D	D	604193.59	1480266.19	18.51	18.21	0.30
DMW-7D	D	604287.20	1479924.19	21.94	21.23	0.71
DMW-8D	D	604516.35	1479673.28	15.79	15.46	0.33
DMW-9D	D	604764.91	1479293.42	11.41	10.29	1.12
MW-15D	D	605010.96	1479028.29	8.77	7.17	1.60
MW-16D	D	605086.42	1479248.84	10.22	9.84	0.38
MW-17D	D	605112.67	1479358.32	7.56	5.41	2.15
MW-18D	D	604934.54	1479642.31	8.88	8.41	0.47
MW-19D	D	604152.70	1479701.18	7.94	7.16	0.78
MW-20D	D	604630.96	1479397.95	12.40	11.38	1.02
MW-21D	D	604467.75	1479303.22	10.78	9.61	1.17
MW-22D	D	604442.07	1479112.84	11.02	9.61	1.41
MW-23D	D	604237.13	1479295.12	10.03	8.82	1.21
MW-26D	D	604726.41	1479035.39	11.66	9.92	1.74
MW-14D	DD	605129.85	1479550.68	11.56	7.97	3.59
MW-27D	DD	605114.25	1479032.00	8.39	5.02	3.37
MW-29D	DD	603774.77	1480488.41	11.43	11.05	0.38
MW-30D	DD	603825.46	1479645.71	8.26	7.37	0.89
MW-31D	DD	603747.78	1480099.58	6.95	6.78	0.17

¹ Well was sealed and abandoned in accordance with Maryland regulations.

NAVD = North American Vertical Datum

NAD = North American Datum

S = Upper surficial aquifer

I = Intermediate surficial aquifer

D = Lower surficial aquifer

DD = Deep confined aquifer

NM = Not measured



* All measurements to the nearest 0.01 foot

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name Location: Weather Con- Tidally Influe	ditions:	MSA-GW Manitaria Project No.: Martin State Airport Personnel: Sunny Whom; High 83 Measuring Device: When Level Meter Yes No Remarks:						
Well or Plezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
mw345	aleir	0725			5.77			
mw34I		0725			5.72			
mw335		6727			7.84			7
MW33T		งาลา			7.94			
mw7		0730			7,36			
mwa55		0733			6.23			1
mwa5I		0733			7.83			75,
Dmwiis		0738			5.69			
DMWII		0737			7.29			
mways		0741			4.81			
THEWM		6420			5.96			6 h
MW30D		0745	4-4		7.37	an-		
mwa35		0748			8,29	1		
TE6um		0749			8.37			
mwa3D		0749			8.82			
MWAI		0756	•		9.12			
mwad		0756	2		9.61			
mu3		0758			9.21			
mwacs		0805			9,47			
MWAGI		0800	2		9,98			
MWaGD		0807			9,92			
Dmwios		0810			8.39			

9,21

	i .
Tt	Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name Location: Weather Cond Tidally Influe	ditions:	MSA- Madi Sunni Yes	n State A	torma Irport High 83	Project No.: Personnel: Measuring Devi	Dawn Markiewicz co: Water Level Meter			
Well or Plezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments	
Dmwls	7/3/10	0818			9.22				
TPIWM		0833			7.17				
MWI9D		0823			7.16				
mwa		C834			7.46				
mwaas		0807			6.31				
mw3aI		0838			6.40				
MW3ID		0834			6.78				
DMWIA		0839			10,45				
Dmw1B		0842			10,71				
mwa b I		0847			7.18				
mward		0848			502			Hornit Ne	
MWI5S		0851			7,88				
MW15I		0852			7.19				
MW15D		0853			7.17				
mwy		0859			8.59			Mouse Ne	
Dmw95		0901			9.85				
IPUMG		0903			69.9				
<u> </u>		0904			10.39				
mwacs		0900			10,89				
MW3OI		0907			10.82				
mw90D		0908			11.38				
DMWSS		0912			12.60			Data Logo	
DMWST	1	0914			15,47			4	
DWM&D		0915			15.46				

11	Tetra Tech NUS, Inc.
	retia recirrico, inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: Location: Weather Cond Tidally Influen	litions:	MSA-GW Mostoms Project No.: Martin State Airport Personnel: Daws Markiews Sunny & Warm; High 83°F Measuring Device: Water Level Me. Yes No Remarks:						
Well or Plezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
RWIT	7)al10	1690	7800		18.11			
Dmwaa		0923			å 1,35			
DmwaB	2	09a4			10,16			
Dmwa5		92			21.29			
RWIS		0938			18,45			
SIWC		P6P0			1857			
Dmw35		0936			10.86	4		
DMWBI		0935			15.95			
Dmw3D		0936	9 (1		1596			
MWI8S		0939			8,56			
MWIST		0939			8.62			
MW18D		0940	4		8.41			
MWITT		9949			11.99			
MW14D		0943			7.97			
MWNS		0946			7.16			
MWITI		0946			6.51		***	
Driwin		0947			5,41			
MW16S		0951			9.73			
MW16I		0952			8.66			
mw16D		0953			9.84			
Dmw40	D	0958			20.06			Data Logg
Dmwy		1000			20.03			Data Logo
Dmw40		1003			20.29			CX.
Dmw75		1008			NIA			Bladder Sho
* All measurements	1	1009		49,59	21,32			

TŁ	Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name Location: Weather Cond Tidally Influe	1	Month	Sw Monst State A Worm; His	mont	Project No.: Personnel: Dawn Markiewicz Measuring Device: Water Level Meter Remarks:			
Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
กพ ร อ	7/2/10	1015		7462	21.23		to the ofference progress.	
MW5		1090	}		21.77			
omuss		1025			20,99			Ant Nes
mwsi		1007			21.03			
MW5D		1038			31.00			
mus		1031			18.39			
Ta) wmc		1032	······································	-	18.26			
DMWGD		1034			16.81			
NW6		1037			15.14		w	
กมอลบ		1050			11,05			
		8 1 1						
	<u> </u>		***************************************					

	······································	1						