Lockheed Martin Corporation
6801 Rockledge Drive MP: CCT-246
Bethesda, MD 20817
Telephone 301-548-2209

August 5, 2015 **VIA PRIVATE CARRIER**

Mr. James R. Carroll
Program Administrator
Land Restoration Program
Land Management Administration
Maryland Department of the Environment
1800 Washington Boulevard, Suite 625
Baltimore, Maryland 21230

Subject: Transmittal of the Block G Soil Remedial Action Plan Addendum 2
Lockheed Martin Corporation; Middle River Complex
2323 Eastern Boulevard, Middle River, Baltimore County, Maryland

Dear Mr. Carroll:

For your review, please find enclosed one hard copy with a CD of the above-referenced document. This Remedial Action Plan Addendum present a changed field condition and path forward associated with soil remediation of Block G. Lockheed Martin would like to execute the plan of action described in this document as soon as possible as the construction team is currently mobilized at the site.

Please let me know if you have any questions. My office phone is (301) 548-2209.

Sincerely,

Thomas D. Blackman
Project Lead, Environmental Remediation

cc: (via email without enclosure)
Gary Schold, MDE
Mark Mank, MDE
Christine Kline, Lockheed Martin
Norman Varney, Lockheed Martin
John Morgan, LMCPI
Michael Martin, Tetra Tech
Cannon Silver, CDM Smith

cc: (via mail with enclosure)
Tom Green, LMCPI
Mike Musheno, LMCPI
Dave Brown, MRAS
Doug Mettee, Lockheed Martin MST

Block G Soil Remedial Action Plan Addendum 2: Supplemental Underground Storage Tank and Transformer Investigation Lockheed Martin Middle River Complex 2323 Eastern Boulevard Middle River, Maryland

Prepared for:

Lockheed Martin Corporation

Prepared by:

Tetra Tech, Inc.

August 2015

Michael Martin, P.G.
Regional Manager

Ivanna Goldsberry, P.E.
Project Manager

TABLE OF CONTENTS

ATTACHMENTS

LIST OF FIGURES

LIST OF TABLES

This page intentionally left blank.

Section 1
Supplemental Underground Storage Tank Excavation Plan

The excavation recently completed within the planned limits described in the January 2014 *Block G Soil Remedial Action Plan, Lockheed Martin Middle River Complex* (Tetra Tech, 2014; approved 3/25/2014) did not locate any of the suspected underground storage tanks (USTs) believed to have been previously abandoned in place. The exploratory excavations did identify a network of terra cotta piping located within an approximate 18 inch thick layer of pea gravel, overlying natural red-brown clay. The depth of the interface between the pea gravel and clay was observed at approximately 4 feet below the ground surface. Historical Site drawings referenced the presence of 8" terra cotta sanitary sewer piping within the UST excavation area limits.

Based on these findings, geophysical reports and Site historical drawings were reviewed to determine if additional areas could be identified as possible locations for the suspected USTs. Based on the review of the geophysical maps, the anomalous areas depicted in the terrain conductivity maps appear to be in proximity to large concrete slabs in the study area.

Therefore, to further investigate the potential presence of USTs in Block G, the following approach is recommended:

- Perform additional excavation northeast of points G52, G53, G56 and G57 (northern limits of suspected UST Area) and southwest of monitoring wells MW-12C and MW-12B (see Figure 1-1). The excavations would be advanced to a depth approximately 2 feet below the pea gravel layer previously identified.

- Excavate two test trenches beneath concrete slabs in proximity to the suspected UST Area. The first trench would be located between Excavation Area J and the existing UST excavation with a second excavation conducted north of MW12C and MW12B. Each excavation would be completed to a depth which penetrates approximately 2 feet into the clay layer. Due to the thickness of the concrete slab between Area J and the UST Area (24 to 30 inches) a hoe ram would be used to remove the slab (see Figure 1-2).

- Excavate two trenches beneath the concrete slab foundation of the former Fuel Test Lab/Vibration Test Lab. Trenches will be located in the area where a recently discovered site plan dating to 1944 shows a fuel oil tank adjacent to the former Vibration Test Lab (see Figure 1-3). The plan does not indicate if the tank was above or below ground but an above ground tank is not visible in historical aerial photographs. Each excavation would be completed to a depth which penetrates approximately 2 feet into the clay layer. Due to the historical uses of the building, it is assumed that the thickness of the concrete slab in this area will be similar to the slab encountered between Area J and the UST Area (24 to 30 inches); therefore, a hoe ram would be used to remove the slab.

In the event USTs are located during either phase, excavation activities would stop to allow for appropriate notification to regulators and subsequent preparations for UST removal.

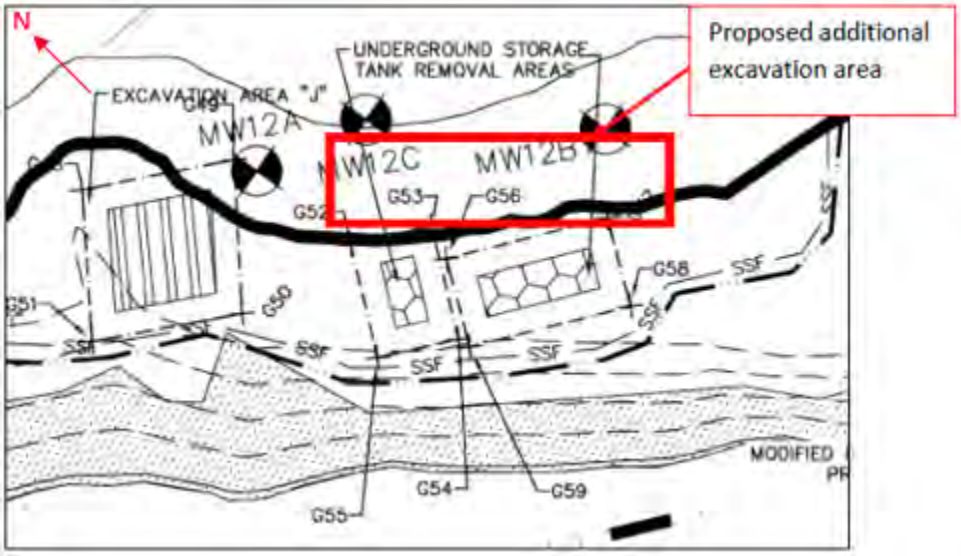


Figure 1-1: Proposed Additional UST Excavation Area

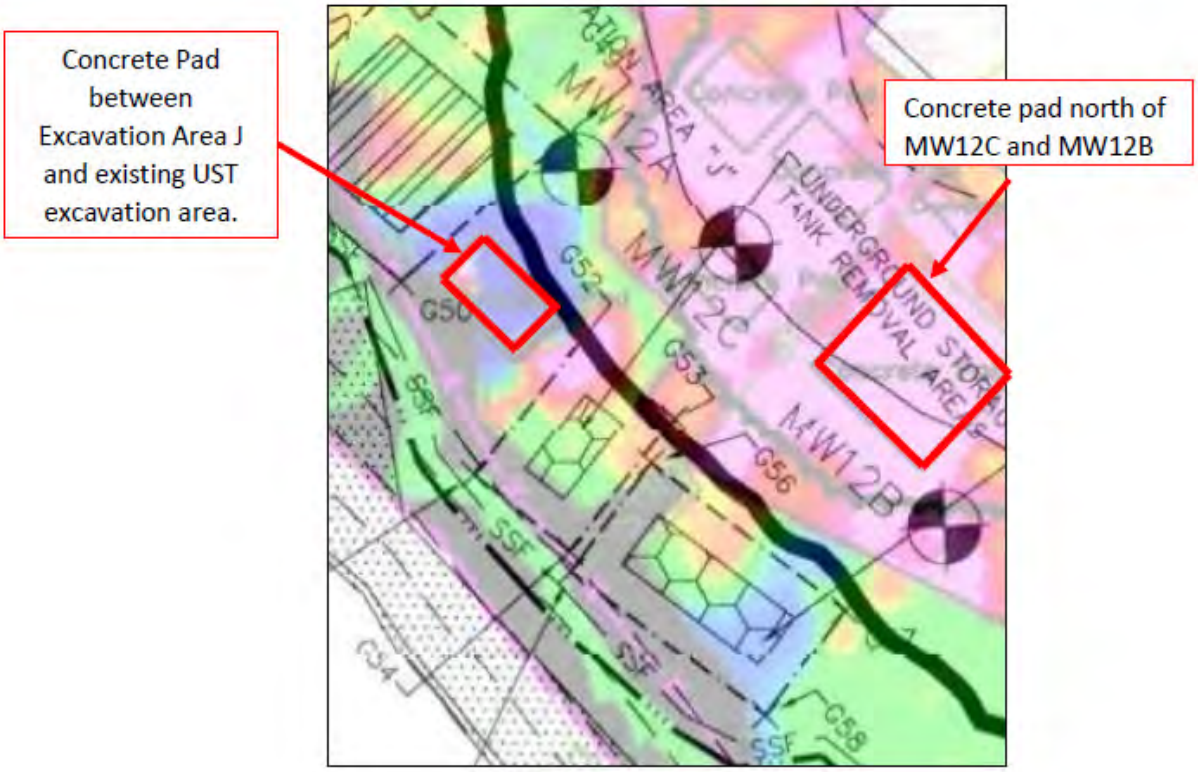
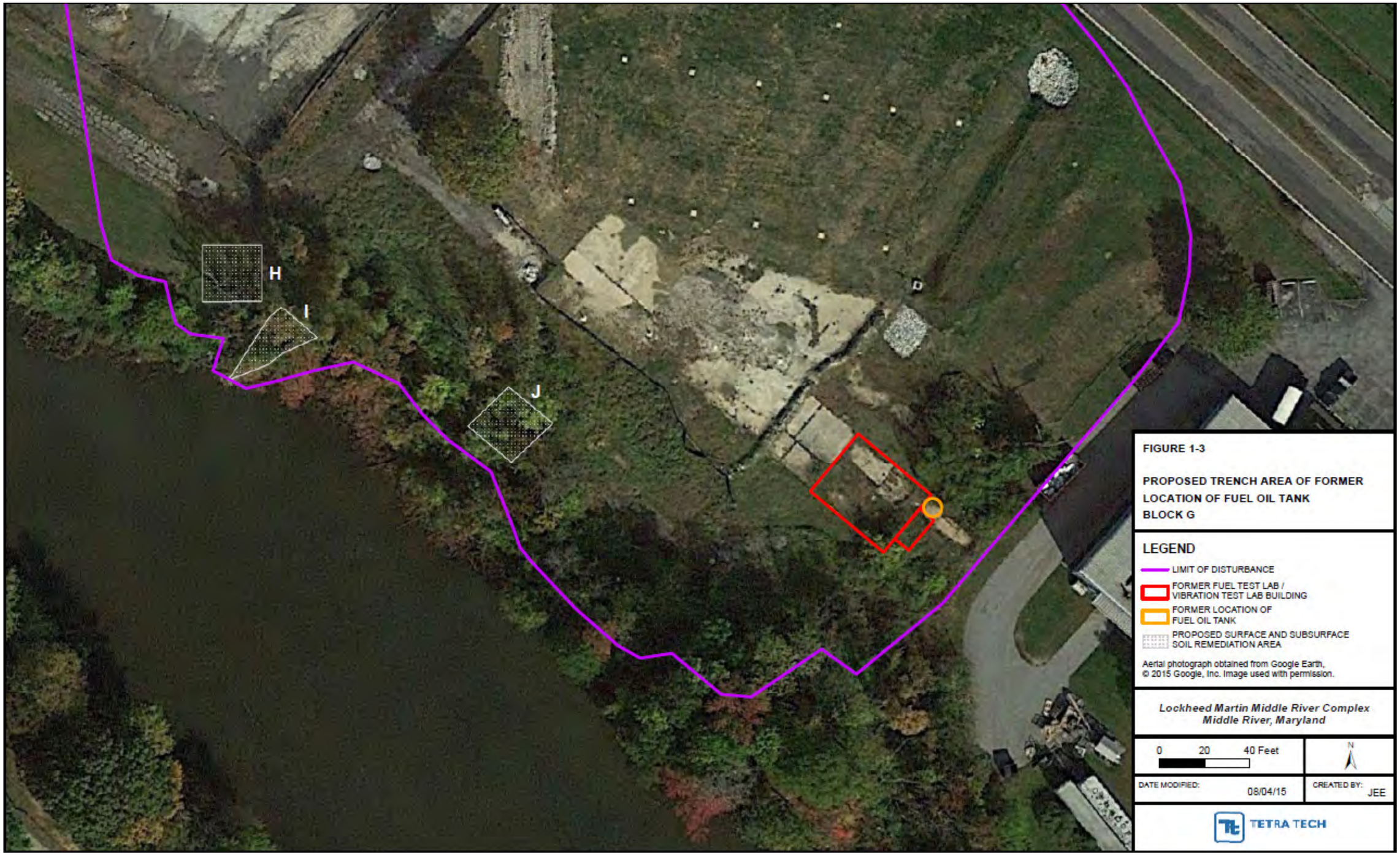


Figure 1-2: UST Proposed Concrete Removal and Trench Area

This page left blank intentionally.


H
I
J
FIGURE 1-3
PROPOSED TRENCH AREA OF FORMER
LOCATION OF FUEL OIL TANK
BLOCK G
LEGEND
LIMIT OF DISTURBANCE
FORMER FUEL TEST LAB / VIBRATION TEST LAB BUILDING
FORMER LOCATION OF FUEL OIL TANK
PROPOSED SURFACE AND SUBSURFACE SOIL REMEDIATION AREA
Aerial photograph obtained from Google Earth, © 2015 Google, Inc. Image used with permission.
Lockheed Martin Middle River Complex
Middle River, Maryland
0 20 40 Feet
N
DATE MODIFIED: 08/04/15
CREATED BY: JEE
TETRA TECH

Section 2
Supplemental Transformer Excavation Plan

2.1 BACKGROUND - POTENTIAL DISPOSAL AREAS

Discussions with current Middle River Complex employees identified two potential transformer disposal areas within Block G at the Middle River Complex (*Block G Transformer Investigation Report*, April 2013). An excerpt from that interview is provided:

> *"On July 7, 2011, Tetra Tech interviewed three Lockheed Martin personnel to obtain additional information regarding historical or existing subsurface utilities in Block G that might not have been mapped on the MRC utility drawing. During that interview, a current Middle River Complex electrician recalled that electrical transformers had been buried in two areas in Block G in the early 1980s. One of the suspected burial areas is in the wooded area southwest of the southern fence for Lot 3, near Cow Pen Creek. The second suspected burial area is in the wooded area southwest of the concrete pads for the former aero physics laboratory/wind tunnel test building. Both suspected burial areas are near the embankments leading down to Cow Pen Creek.*
>
> *"It was stated that five to ten canister type electrical transformers had been buried at each location. The transformers were 5– to 15–kilovolt units that had been removed from poles in Lots 2 and 3. Each transformer likely contained ten to 15 gallons of polychlorinated biphenyl (PCB) transformer oil which was not drained before placement in the pits. Several transformers were reportedly damaged and leaking oil before placement. Details regarding this interview are provided in the Utility Cross-Connection Investigation Report (Tetra Tech, 2012a)."*

A hand drawn depiction of the two locations that were described by Lockheed Martin personnel is provided in Attachment A (Figure from the Utility Cross-Connection Investigation Report, 2012).

As a result of these discussions, geophysical surveys were conducted within Block G in an attempt to locate the disposal areas. The geophysical survey findings are provided in Attachment B (Geophysical Survey, Electrical Transformer Pit Phase 2, September 2012). In combination with the geophysical survey, four test pits (TP-A, TP-B, TP-C, and TP-D) were excavated in areas with strong geophysical signals that also corresponded with the anecdotes regarding the transformer disposal. The test pit locations are identified on Figure 2 of Attachment A. No transformers were found within these test pits.

2.2 RECENT FINDINGS IN BLOCK G

During the completion of the scheduled soil removal activity in Block G, Excavation Area J, parts for two electrical transformers were uncovered. The parts were found buried at depths ranging between 2 and 3 feet below the ground surface northwest of Area J in area being cleared for placement of a stormwater bypass pipe. This area had not been previously identified as a potential disposal area during the geophysical survey due to the presence of vegetation which limited access by the geophysical survey staff and interference from nearby concrete slabs. These transformer locations, overlain on the geophysical survey results, are provided on Figure 2-1 below. Note, the limited access areas are depicted in black on Figure 2-1.

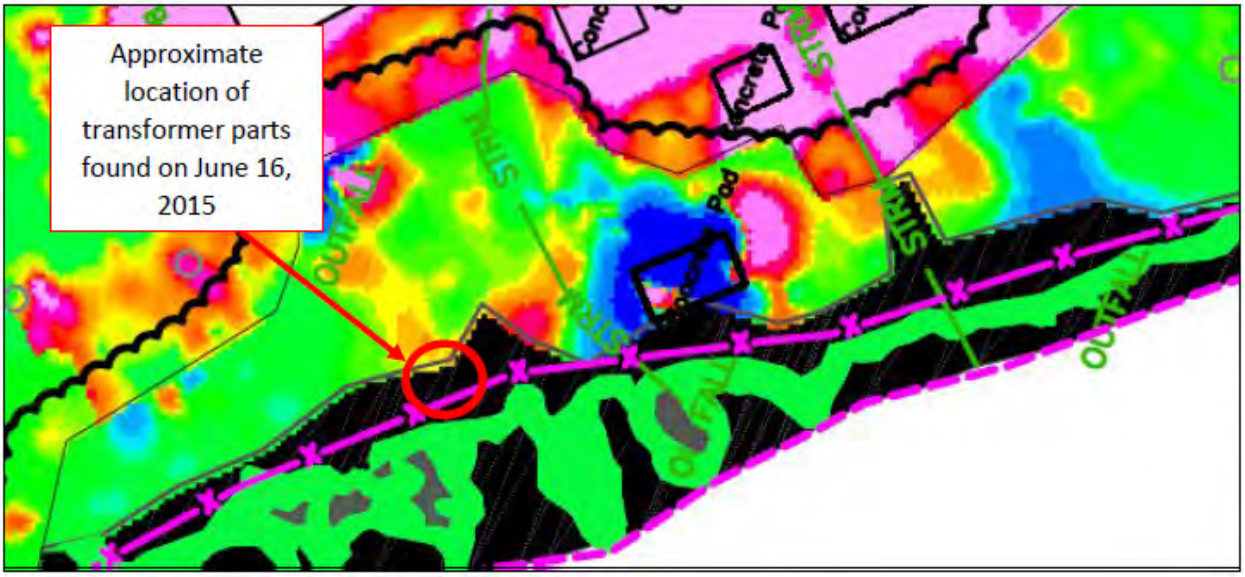


Figure 2-1: Location of Transformer Parts Found on June 16, 2015

When found, the transformer parts and soil adjacent to the transformers were excavated and placed in covered roll-off boxes pending the completion of analysis for polychlorinated biphenyls (PCBs) via EPA Method 8082A. Four samples were collected and analyzed for PCBs. Samples G-TR-1 and G-TR-2 were collected from the holes from which the transformers were removed. Composite soil samples, G-TR-WC1 and G-TR-WC2 were collected from soil placed in the roll-off boxes. The results of the analyses are provided in Table 1.

Aroclor 1260 was the only PCB mixture detected in the samples. One of four detections and two of four detections exceed the EPA RSLs for industrial soils and residential soils, respectively (established at the 1×10^{-6} cancer risk level). No detections exceed either RSL if set at the 1×10^{-5}

risk level. The concentrations do not exceed the remedial goal established for Aroclor 1260 for Block E soils for the industrial worker (10 mg/kg, set at the 1×10^{-5} cancer risk level). The maximum Aroclor 1260 detection would not present an adverse non-cancer risk for the worker or for the resident. The residual risk assessment would not have targeted this area for remediation (for purposes of direct contact worker protection). This is not a significant direct-contact risk issue for the worker.

2.3 PROPOSED INVESTIGATION

To further investigate the potential presence of transformers in Block G, the following investigations are recommended. The investigations are proposed adjacent to the recently identified transformer disposal location and other areas within Block G.

Known Transformer Disposal Area

An excavation measuring approximately 30 feet by 30 feet is proposed immediately adjacent to the area where the transformers were found adjacent to Excavation Area J (Figure 2-2). The area would extend north/northwest of Excavation Area J along the limits of the existing silt fence installed for the soil removal activities.

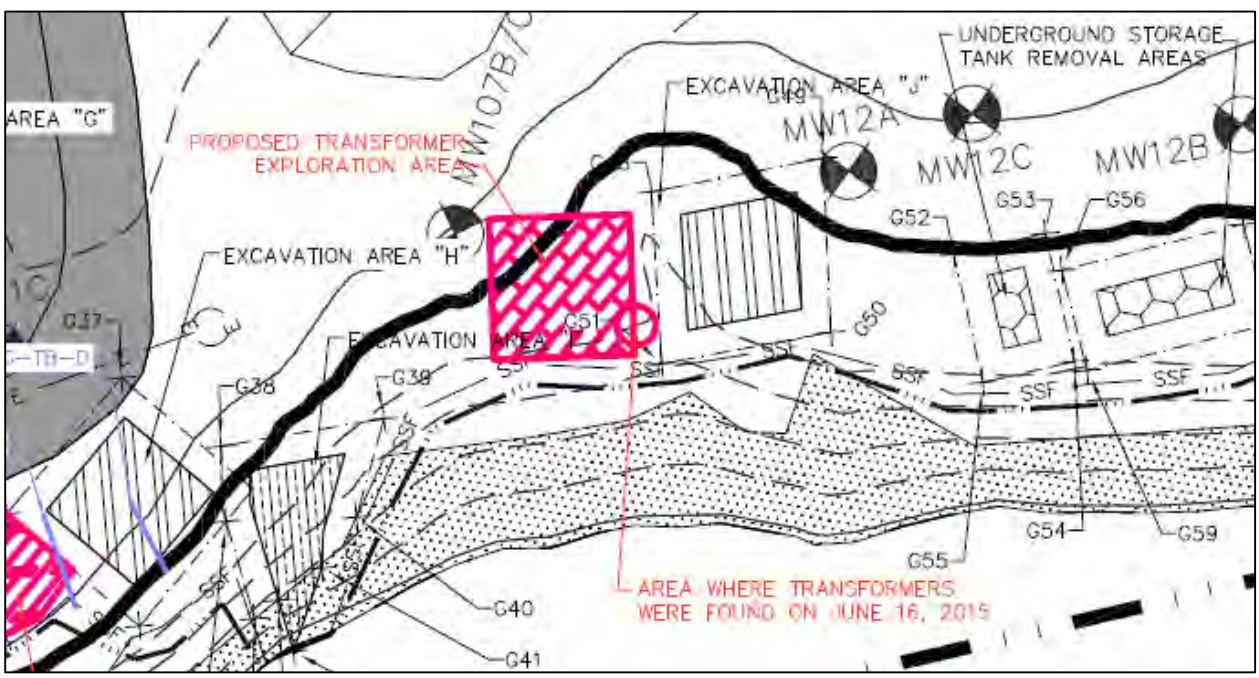


Figure 2-2: Proposed Transformer Exploration Area

As this area has been cleared of dense vegetation, a metal detector (magnetic and pipe and cable locator) survey will be conducted to aid in the identification of potential anomalies prior to excavation. The survey equipment can detect metallic items at shallow depth and will help minimize the potential disturbance of a transformer containing fluid, should they be present.

Following the survey, soil across the proposed excavation area will be removed to a depth of one foot. The soil will placed in roll-off boxes and covered. Should electric transformers and transformer parts be found, they will be placed in overpack drums pending further characterization.

Following removal of one foot of soil, the resulting surface area will be scanned, and an additional one foot of soil will be removed. Excavation will continue in this manner to a minimum depth of four feet.

As described previously, all soil will be stored in covered roll-off containers pending completion of the investigation. If no transformer or transformer parts are encountered, the site will be backfilled with the soil removed during the investigation. The site will then restored to pre-existing grades and seeded.

If a transformer is found it will be placed in an overpack drum to ensure that any fluids will be properly contained. Any fluids or soils in the vicinity of the transformer will be sampled and properly characterized.

All soil samples collected during the progress of the work will be analyzed for PCBs via Method 8082A and VOCs via Method 8260B along with any analyses required for characterization and disposal.

The investigation area will be surveyed at completion and recorded in the Block G construction report.

Potential Transformer Disposal Areas

Given that two disposal areas were believed to have been used for transformer disposal within Block G, additional test pit locations are proposed along the top of the bank of Cow Pen Creek and in the areas adjacent to Block G Excavations Areas H and J. The test pits would be excavated within the anomalous areas identified during the geophysical survey northwest of the known

transformer area and northwest of test pit TP-A (Figure 2-3). The test pits would be placed as close as possible to the top of the stream bank and the tree line. The test pits excavated outside of the permitted limit of disturbance would be required to be stabilized at the end of each work day to minimize the potential for erosion. The test pit exploration will occur when rain is not expected in the forecast to reduce the runoff. All test pit areas would be backfilled and restored at the end of each day's work. Restoration will include regrading and seeding.

No other anomalous areas of a size that would correspond to a large transformer disposal area believed to present within Block G that have not been included in a prior test pit program or the ongoing soil removal project.

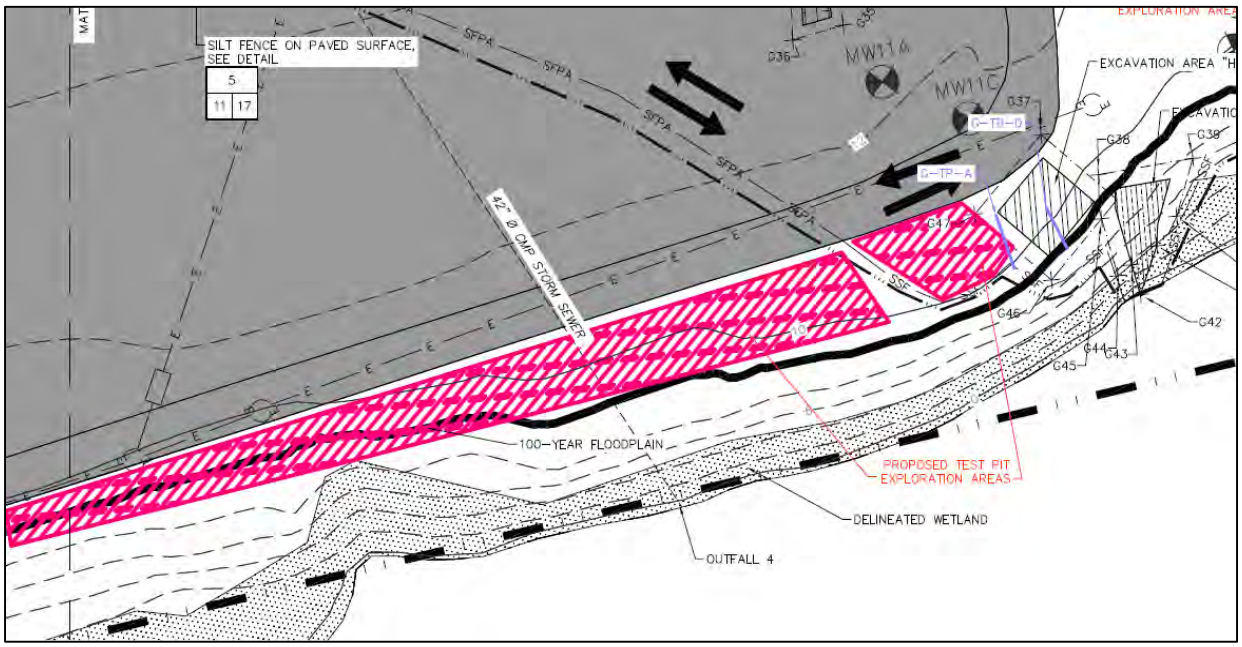


Figure 2-3: Proposed Test Pit Exploration Area

If a transformer is identified in a test pit, it will be placed in an overpack and the adjacent soils sampled. Given that disposal has been reported to have consisted of groups of five to ten transformers, if a transformer is found within a test pit, the test pit area would be restored and no additional investigation will advance until contingencies are put in place for the management of a larger number of transformers and permits have been obtained for additional investigation and removal across a larger area (i.e., installation of erosion controls).

Table 2-1: Results of Soil Collected Near Transformer Parts

SAMPLE ID	G-TR-1		G-TR-2		G-TR-WC1		G-TR-WC2	
	06/16/2015		06/16/2015		06/16/2015		06/16/2015	
	SOIL from Excavation		SOIL from Excavation		SOIL (composite from rolloff for characterization)		SOIL (composite from rolloff for characterization)	
PCBs (µg/kg)								
AROCLOR-1016	17	U	71	U	13	U	14	U
AROCLOR-1221	23	U	95	U	17	U	18	U
AROCLOR-1232	28	U	120	U	21	U	23	U
AROCLOR-1242	16	U	65	U	11	U	12	U
AROCLOR-1248	11	U	47	U	8.3	U	9	U
AROCLOR-1254	20	U	83	U	15	U	16	U
AROCLOR-1260	300		1100	J	95		140	

J - Estimated

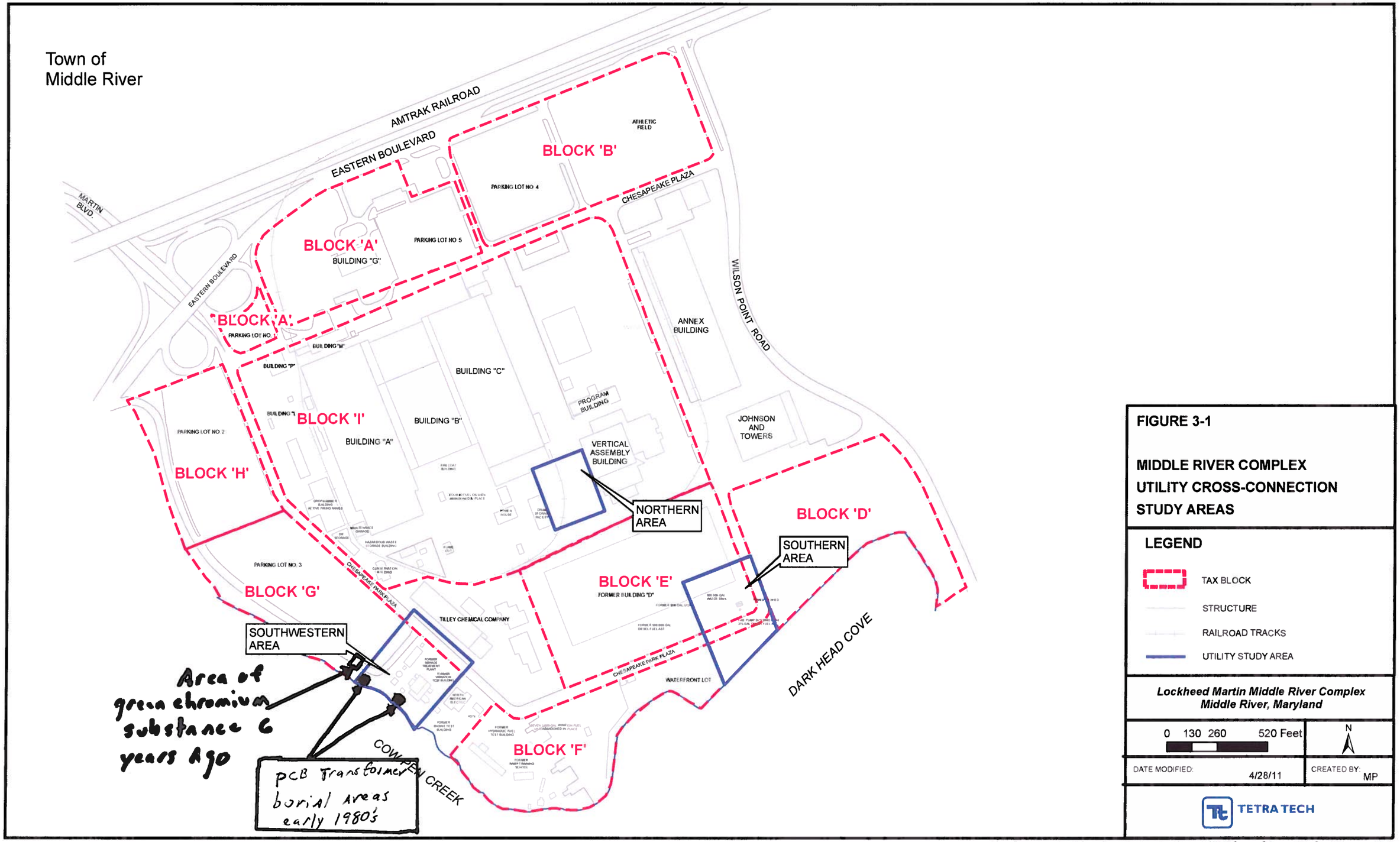
U - Non-detect

µg/kg – micrograms per kilogram

ATTACHMENT A

BLOCK G HAND MARKED FIGURE FROM UCC REPORT

July 7, 2011 Interviews MRC



Map Document: (K:\GProject\middle_river\Maps\Utility Cross Connection Study Areas.mxd)
4/28/2011 -- 12:33:39 PM

ATTACHMENT B

BLOCK G PHASE II GEOPHYSICAL SURVEY REPORT

Final Report
Geophysical Survey
Electrical Transformer Pit Phase 2
Middle River Complex G Block
Middle River, MD
Enviroscan Reference Number 081220

Prepared For: Tetra Tech
Prepared By: Enviroscan, Inc.
September 7, 2012

1051 Columbia Avenue ● Lancaster, PA 17603 ● 717.396.8922 ● Fax 717.396.8746 ● email@enviroscan.com ● www.enviroscan.com

September 7, 2012

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

RE: Geophysical Survey
Electrical Transformer Pit Phase 2
Middle River Complex G Block
Middle River, MD
Enviroscan Reference Number 081220

Dear Mr. Murali:

Pursuant to your request, 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 expand the original survey area size of the suspected transformer pit delineation project performed in April 2012 (see Enviroscan report #021215 dated March 8, 2012), which was designed to detect and delineate the horizontal boundaries of reported transformer burial pit areas along the southwestern border of G Block, adjacent to Cow Pen Creek, using a Geonics EM-31 MK2 electromagnetic (EM) survey (see pink-lined area, Figure 1). The survey area was extended approximately 250 feet north from the original northern data extents along the bank of the creek and 340 feet south from the southern data extents along the back of the creek (see orange-lined area, Figure 1).

The southwestern border of G Block near the former waste water treatment plant site is heavily vegetated up 50 feet east of the eastern side of Cow Pen Creek. For the purposes of this survey, the vegetation was cut (by others) in east-west oriented lanes, 10 feet apart, along the east side of Cow Pen Creek to allow for access to the vegetated area. Also present is a security fence located roughly 15 to 30 feet away from the waterline of Cow Pen Creek. Due to the vegetation and steep creek bank terrain, the EM-31 MK2 equipment could not be utilized west of the security fence. In this area a smaller handheld EM instrument was used.

Survey Methods

The results of the EM-31 MK2 survey performed in April 2012 showed only one aerially extensive anomaly that may result from a burial pit of transformers. The size and boundary of this anomaly were not well-constrained by the Phase 1 survey because the anomaly was located partially outside the southern edge of the original survey limits, on property that was not included in the access agreement. The location of this anomaly was not near any of the reported possible burial pit locations. No large anomalies were found coincident with the reported possible burial pit locations. Survey results indicated that the transformers may not be buried all together in one pit, or that the transformers were not buried near any of the reported possible locations; therefore, the survey area was expanded and the instrumentation proposed to detect the targets of interest was changed. The new additional instrumentation utilized for this survey is the EM-61 MK2, a high resolution metal detector. The EM-61 MK2 is better suited to indentify targets the size of a single buried transformer as well as a burial pit. The only limitation for the EM-61 MK2 is terrain type, since it cannot be utilized in highly vegetated terrain. The paths cut into the vegetation for this survey were cleared more carefully to allow for the utilization of the EM-61 MK2, which was also used to map the subsurface structures and utilities in the Block G Cross Connection survey of June 2011 (Enviroscan report 061102 dated June 30, 2012). This area is shown as the blue-lined area, Figure 1 of this most recent report).

Enviroscan performed EM mapping of the site using a Geonics EM-61 MK2, EM-31MK2, and Fisher TW-6 instruments. The EM-61 MK2 was selected (as described above) due to its sensitivity to small and large metallic objects. EM-31MK2 was previously selected due to its ease of use in rough terrain and 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 TW-6 instrument is a smaller metal detector and was utilized in the areas west of the security fence along the bank of Cow Pen Creek.

EM-61 MK2

The EM-61 MK2 uses a one-meter by ½-meter coil to transmit 150 electromagnetic pulses per second into the ground at each measurement station. During the off-time between transmitted pulses, a receiver coil measures the decay of transient electrical currents induced by the transmitted pulses. The decay is characterized by recording the strength of the transient electrical currents (in milliVolts) at four different delays or time gates following shut-off of the applied field. Electrical currents in moderately conductive earth materials (e.g. electrolytic soils) dissipate rapidly, leaving the more prolonged currents due to buried metallic objects. The EM-61 MK2 measures the surficial electrical potential due to the prolonged subsurface currents, providing a digital read-out of the relative metallic content of the subsurface.

To complete the EM-61 MK2 survey, a system of profiles (at approximately 5-foot intervals in open areas and 10-foot intervals in vegetated area) was surveyed by hand-towing the EM-61 MK2 in each survey area. Data were collected at a rate of four readings per second (for an average station spacing of approximately one foot). Location control was maintained using a Topcon GMS-110 global positioning system (GPS) receiver. The GPS positions were collected with real-time differential correction, using the corrections from a coastguard beacon in Annapolis, MD. The resulting differential GPS (DGPS) positions have an accuracy of better than two feet. GPS and EM data were fed simultaneously to a Juniper System Allegro data logger running Trackmaker 61 software by Geomar, Inc. This software allows display of the data coverage in real time to ensure complete site coverage.

The EM-61 MK2 records four measurements spaced by time (time gates) after the initial transmit pulse. Gate 1 reads responses from metal targets of all depth and size within the range and sensitivity of the instrument. Gate 2 filters out the smallest targets. Gates 3 and 4 read responses from large targets, with Gate 4 showing the least interference from smaller targets. The purpose of this survey was to detect and delineate possible individual buried transformers or a burial pit of multiple transformers; therefore, Gate 3 was selected for the best display of possible targets of interest. Results of the EM-61 MK2 survey are depicted as contours of the individual EM-61 MK2 station measurements in millivolts on Figure 2. The color contours depicted in Figure 2 show increasing metallic response from green to yellow to orange to red to pink colors.

EM-31 MK2

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 the EM-31MK2 in vertical dipole mode. 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. Below five feet, the sensitivity diminishes approximately logarithmically. 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 5-15 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-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 inphase data were contoured using minimum curvature gridding routines in Geosoft Oasis Montaj ™. 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).

TW-6

In order to detect unknown metallic objects west of the security fence adjacent to the former water treatment plant, Enviroscan employed a Fisher TW-6 pipe and cable locator and tracer. In pipe and cable search mode, the TW-6 is essentially a deep-sensing metal detector that detects any highly electrically conductive materials (e.g. metals) by creating an electromagnetic field with a transmitting coil. A receiving coil at a fixed separation from the transmitter measures the field strength. As the instrument is swept along the ground surface, subsurface metallic bodies distort the transmitted field. The change in field strength/orientation is sensed by the receiver, setting off an audible alarm and/or causing deflection of an analog meter. The TW-6 can nominally detect a 2-inch metal pipe to a depth of 8 feet and a 10-inch metal pipe to a depth of 14 feet.

The TW-6 response to metal is an audible sound only; no data are recorded with this instrument. For this survey, the operator wore a GPS unit (the same one utilized in the EM-31 MK2 survey) and continuously recorded its location while the area was swept with the TW-6.

Results

The EM survey results are depicted in Figure 2, showing the Channel 3 EM-61 MK2 results in millivolts from this survey, the inphase results from the previous survey in parts per thousand, and the combined TW-6 results from both surveys. Also included are the EM-61 MK2 results from the Block G Cross Connection survey.

The EM-61 MK2 data shows several areas of interest. The first, along the shoreline north of the former sewer treatment plant, is a large area of moderate- to high-amplitude Channel 3 metallic response, above 60 millivolts (see northern blue dashed polygon, Figure 2). Visual inspection of the shoreline in this area reveals significant amounts of fill material containing metal, such as concrete debris with rebar. It appears that most of this shoreline has been built up with demolition debris with a high metallic content. Enviroscan suggests performing a test pit in this area to ground-truth the source of the metallic anomalies. Comparison of the unearthed source material with the amount of metal in a transformer or group of transformers would help determine if these objects could be buried as a group or dispersed throughout this band of moderate to high metallic response material. GPR follow-up imaging was indicative of scattered debris. The suggested location and orientation of the test pit is shown on Figure 2 as a thick purple line labeled TP – A.

The second area of interest is located coincident with the EM-31 MK2 anomaly described above from the previous survey. The EM-61 MK2 survey further delineated the size and orientation of the metallic anomaly. This area is directly adjacent to a heavily vegetated drainage swale that could not be cleared of surface vegetation so the anomalous area was not fully imaged, furthermore, the southeastern edge of the anomaly results from a pile of concrete parking lot barriers, i.e. the concrete bumper located in each parking space in a parking lot. The suggested location and orientation of the test pit for this location is shown on Figure 2 as a thick purple line labeled TP – B. GPR imaging was not possible in this area due to poor signal penetration, a common problem throughout this site.

The third area of interest is located in the asphalt access/parking area southwest of the North American Electric building. This anomaly is a high-amplitude EM anomaly. GPR follow-up imaging suggests a single target dipping to the north; however, several other small targets were also imaged. The suggested location and orientation of this test pit is shown on Figure 2 as a thick purple line labeled TP – C.

The last area of interest is in the southern extension of the survey area. A large area of small scattered metallic anomalies was delineated. GPR follow-up imaging suggests very small scattered anomalies, several of which were too small to image with GPR or re-acquire with the TW-6 instrument.

The TW-6 survey west of the security fence along the creek bank detected no metallic objects.

Conclusions

The EM survey results indicate only two areas characteristic of a possible burial pit, labeled TP-B and TP-C. The survey showed no other anomalies characteristic of a burial pit, contrary to eye-witness accounts, which indicated two such possible pits. The survey delineated a large EM anomaly along the creek bank north of the former sewer treatment plant. This anomaly could contain individual/ungrouped transformers; however, the size of the anomalous area makes it impossible to pick individual targets. Enviroscan suggests performing a test pit within this anomalous area to better define the material responsible for this anomaly.

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.

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

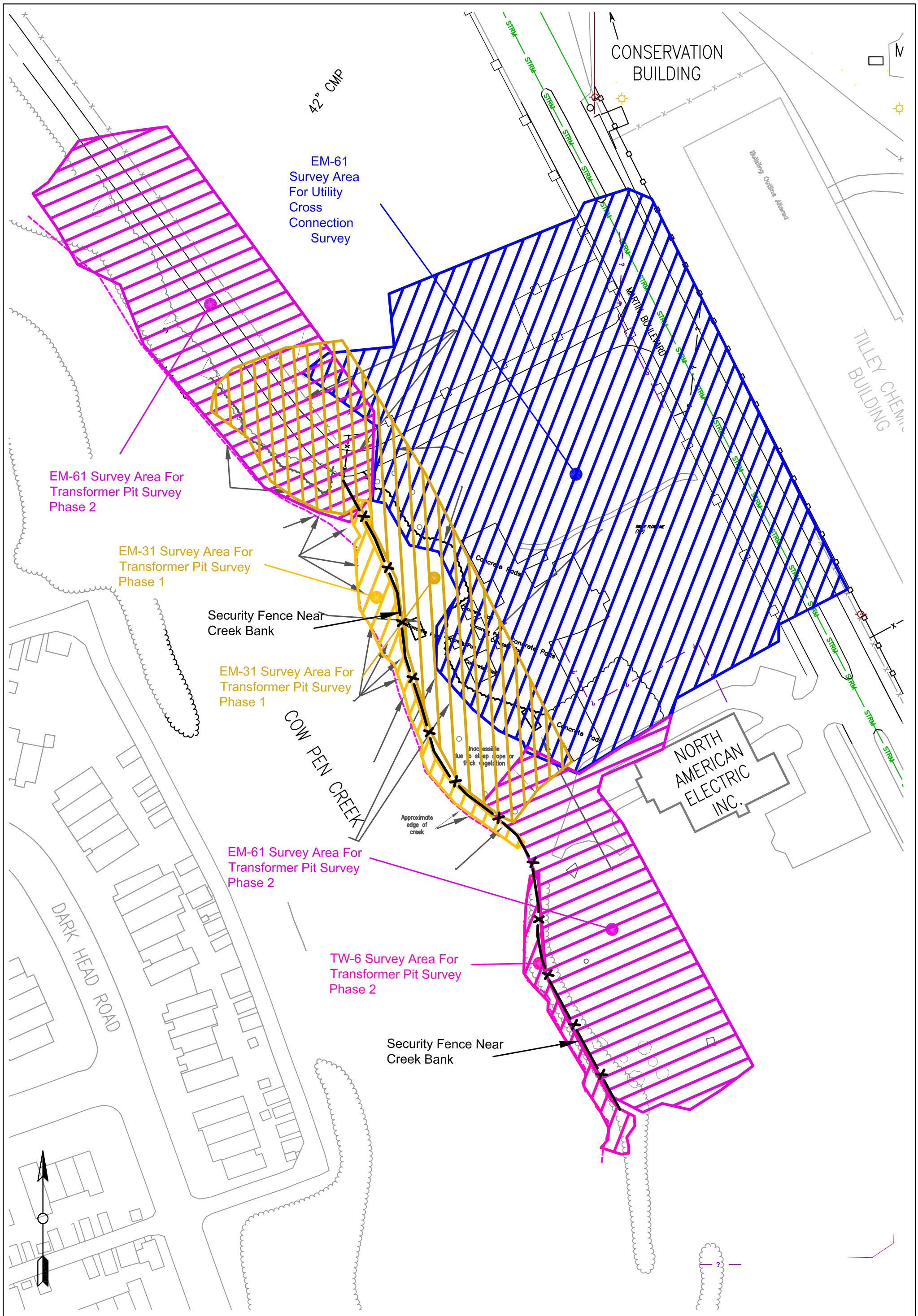
Sincerely,
Enviroscan, Inc.

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: Current and Past EM Survey Areas
Figure 2: EM Survey Results with Proposed Test Pits



Prepared by:

Enviroscan, Inc.
1051 Columbia Avenue
Lancaster, PA
(717) 396-8922

Current and Past EM Survey Areas

G Block Survey Area
Middle River Complex
Middle River, MD

Figure 1

Project Number	Survey Date	Drawn by:
081220		WES
Original Scale	Revision/Issue	Approved by:
1" = 80'	09/04/12	

EM-61 data affected by interference of above ground power lines.

Area scanned with TW-6, No metallic anomalies found.

42" CMP

Abandoned

CONSERVATION BUILDING

HYD on City Line

Building Outline Altered

TILLEY CHEMICAL BUILDING

MARTIN BOULEVARD

Anomaly resulting from Wooden Pole Electric Goes Overhead

Inaccessible due to thick vegetation

Anomaly resulting from buried pipes

Anomaly resulting from fence, catchbasin and buried pipe

Anomaly resulting from fence

Anomaly resulting from buried pipes

TP - A

Area within Blue Dashed Polygon indicative of scattered metallic debris.

TW-6 and GPR follow-up survey also indicative of scattered debris, not buried concentration of transformers

Test Pits should still be performed along this area to determine source of anomalies, in case transformers were not buried as a group.

Approximate edge of creek

Proposed Test Pit Location To Confirm Debris

COW PEN CREEK

Inaccessible due to steep slope or thick vegetation

Inaccessible due to thick vegetation

SINGLE FLOW LINE (TYP)

Concrete Pads

Concrete Pad

NORTH AMERICAN ELECTRIC INC.

TW-6 investigation west of G Block security fence; Area scanned with TW-6 ONLY.

No anomalies found.

Inaccessible due to steep slope or thick vegetation

TP - B

Approximate edge of creek

Anomaly resulting from large area of scattered metallic objects.

Anomaly resulting from concrete parking bumpers at surface.

Pole Barn

Dumpster

Trailer

TP - C

Proposed Test Pit Location To Determine Source of Anomaly

TW-6 investigation of blue dashed area indicative of small debris

Anomaly resulting from fence

GPR imaging shows this anomaly to be a buried metal pipe segment

TW-6 investigation west of G Block security fence; Area scanned with TW-6 ONLY.

No anomalies found.

DARK HEAD ROAD

Increasing Metallic Response (mV)

The information depicted on this drawing represents survey results on the date surveyed and can only be considered to be indicative of the general conditions existing on that survey date.

Coordinates in Maryland State Plane (feet) NAD-83 Datum.

- Electrical Line
- Telcom Line
- Storm Line
- Domestic Water Line
- Fire Protection Line
- Gas Line
- Unknown Utility

Prepared by:				
Enviroscan, Inc. 1051 Columbia Avenue Lancaster, PA (717) 396-8922	EM Survey Results with Proposed Test Pits	G Block Survey Area Middle River Complex Middle River, MD		Figure 2
		Project Number 081220	Survey Date	Drawn by: WES
		Original Scale 1" = 80'	Revision/Issue 08/23/12	Approved by: