DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
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March 2, 2015

Directorate of Public Works

Mr. Robert Stroud
USEPA Environmental Science Center
701 Mapes Rd
Fort Meade, MD 20755

Dear Mr. Stroud:

This letter serves as notification that the December 2014 *Final Remedial Action Completion Report* (RACR) for FGGM-13, Former Pesticide Shop at Fort George G. Meade has been signed by the Army and Environmental Protection Agency. The Certification Statement (page 26) and updated CD are enclosed. Copies of the RACR have also been furnished to Fran Coulters (U.S. Army Environmental Command), Elisabeth Green (MDE), and the Fort George G. Meade Restoration Advisory Board.

If you have any questions, please feel free to contact Ms. Denise Tegtmeyer at (301) 677-9559 or me at (301) 677-7999.

Sincerely,

George B. Knight, PG
Program Manager, Installation Restoration Program
Directorate of Public Works-Environmental Division

Enclosure

ARCADIS

Imagine the result

FINAL Remedial Action Completion Report

FGGM 13, Former Pesticide Shop, Building 6621

Fort George G. Meade, Maryland

December 2014

Bob White, PE
Project Engineer

Brian Stempowski, PE, PMP
Phase Manager

Tim Llewellyn
Project Manager

Final Remedial Action Completion Report

FGGM 13, Former Pesticide Shop, Building 6621
Fort George G. Meade, Maryland

Prepared for:
U.S. Army

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Our Ref.:
GP09MEAD.PEST

Date:
December 2014

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List of Acronyms and Abbreviations

%	Percent
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
ARCADIS	ARCADIS U.S. Inc.
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COCs	Constituents of Concern
DOC	Dissolved Organic Carbon
E&SC	Erosion and Sediment Control
EC	engineering controls
ERD	Enhanced Reductive Dechlorination
ESD	Explanation of Significant Differences
EVO	Emulsified Vegetable Oil
FFS	Focused Feasibility Study
FGGM	Fort George G. Meade
FGGM 13	Former Pesticide Shop, Building 2261
ft	feet/foot
HDPE	High Density Polyethylene
IC	institutional controls
IRP	Installation Restoration Program
LUC	Land Use Control
MCLs	Maximum Contaminant Levels
MDE	Maryland Department of the Environment
mg/kg	milligrams per kilogram
mg/L	milligrams per liter

List of Acronyms and Abbreviations continued

MW	monitoring well
NCP	National Oil and Hazardous Substance Contingency Plan
PCE	Tetrachloroethene
PP	Proposed Plan
RAB	Restoration Advisory Board
RACR	Remedial Action Completion Report
RAOs	Remedial Action Objectives
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
SCL	Site Cleanup Level
Site	FGGM 13, Former Pesticide Shop, Building 6621
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
U.S.	United States
U.S. Army	United States Army
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

Executive Summary

This Remedial Action Report summarizes the implementation of the selected remedy at Fort George G. Meade (FGGM), Former Pesticide Shop, Building 6621 (herein referred to as FGGM 13 or the Site) to address unacceptable risk posed by heptachlor epoxide and chlordane concentrations in soil and chlorinated volatile organic compounds concentrations in groundwater at the Site. Environmental impacts at the Site are a result of spills and mishandling of pesticides and other chemicals that occurred between 1958 and 1978, during active operation of the former Pesticide Shop, Building 6621.

Subsequent to the alternatives analysis conducted in the Focused Feasibility Study (ARCADIS, 2012a), a Record of Decision (ROD; United States [U.S.] Army, 2012) authorizing the selected remedy was approved and signed by the U.S. Army and U.S. Environmental Protection Agency on September 26, 2012, and September 27, 2012, respectively. The remedy selected within the ROD was Soil Excavation with Off-Site Disposal, Enhanced Reductive Dechlorination with Long-term Monitoring of Groundwater, and Land Use Controls. The selected remedy was modified by an Explanation of Significant Difference (U.S. Army, 2014) to account for an increase in soil quantity. A Remedial Design (ARCADIS, 2013) and a Remedial Design Addendum (ARCADIS, 2014) were developed to direct the implementation of the selected remedy. Implementation of the selected remedy was conducted December 2013 through June 2014 and included the following major components:

- Excavation and disposal of 1,726 tons of pesticide impacted soil comprised of 809 tons of non-hazardous soil, 467 tons of hazardous soil with concentrations of chlordane less than 50 milligrams per kilogram (mg/kg), and 450 tons of hazardous soil with concentrations of chlordane greater than 50 mg/kg;

- Segregation and stockpiling of non-impacted soil identified 4 to 8 feet (ft) below ground surface (bgs) as well as soil removed during the excavation of sloped sidewalls constructed to facilitate excavation stability;

- Collection of confirmation soil samples from excavation sidewalls and stockpiled soil;

- Backfill of the excavation with the non-impacted stockpiled soil (4 to 8 ft bgs layer and sidewall soil) and imported fill to achieve final grades;

- Dewatering of the excavation and treatment and discharge of containerized water;
- Installation of monitoring well (MW)-9 at the southeast corner of the intersection of York Avenue and Gordon Street;
- Abandonment and re-installation of MW-2R within the central portion of the excavation footprint;
- Completion of a baseline groundwater sampling event;
- Injection of 17,685 gallons of a 2 percent (%) emulsified vegetable oil (EVO) and 1% molasses solution at six injection points using direct-push technologies;
- Site restoration; and
- Implementation of land use controls including engineering controls (i.e., retention of the existing chain link fence and installation of signage restricting uncontrolled and unauthorized intrusive activities) and institutional controls (i.e., inclusion of the prohibition of residential land use and groundwater use at the Site in the FGGM Real Property Master Plan and the Installation Geographical Information System).

The Remedial Action Objectives were met (as documented in this report) through the excavation and disposal of the impacted soil, completion of EVO/molasses injections, and implementation of land use controls.

1. Overview

ARCADIS U.S. Inc. (ARCADIS) has been retained by the United States (U.S.) Army Environmental Command to perform Installation Restoration Program (IRP) activities at Fort George G. Meade (FGGM), located in Anne Arundel County, Maryland. This work is being conducted under a Performance Based Contract associated with the IRP at FGGM. The full scope of services for this contract is defined in Contract W91ZLK-05-D-0015: Task 0005.

The IRP activities at FGGM are conducted under the U.S. Army's Defense Environmental Restoration Program and operate principally under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 and National Oil and Hazardous Substances Pollution Contingency Plan (NCP;40 Code of Federal Regulations [CFR] 300). FGGM was placed on the National Priorities List on July 28, 1998. Coordination and input are provided by the U.S. Environmental Protection Agency (USEPA) Region III. Input and coordination from Maryland Department of the Environment (MDE) was also solicited.

This Remedial Action Completion Report (RACR) has been prepared to document the implementation of the selected remedy for FGGM 13 Former Pesticide Shop, Building 6621 [herein referred to as FGGM 13 or "the Site"] as specified in the Record of Decision for the Site (ROD; U.S. Army, 2012) and as modified by the Explanation of Significant Differences (ESD; U.S. Army, 2014).

The ROD for FGGM 13 was developed jointly between the U.S. Army and the USEPA, with input from the MDE and the community. The ROD was approved and signed by the U.S. Army and USEPA on September 26, 2012, and September 27, 2012, respectively. The selected remedy in the ROD was Alternative 3: Soil Excavation with Off-Site Disposal, Enhanced Reductive Dechlorination (ERD) with Long-term Monitoring of Groundwater, and Land Use Controls (LUCs). Following pre-excavation delineation sampling and waste characterization (refer to the Remedial Design [RD] for additional details [ARCADIS, 2013]), an ESD was prepared and submitted in February 2014 to document changes in the scope of the remedy due to the increased volume of soil disposal and changes in the associated cost to implement the remedy.

1.1 Site Background

FGGM is located midway between the cities of Baltimore, Maryland, and Washington D.C. in Anne Arundel County, Maryland, as shown on **Figure 1**. The Site is located at the northwest corner of the intersection of Gordon Street and York Avenue in the

southern portion of FGGM. A Site location map is provided as **Figure 2**, and an aerial map of the Site is presented on **Figure 3**.

The Former Pesticide Shop, Building 6621, was reportedly labeled as a “Mess Hall” in the Real Property Master Plan (Atkins, 2011) and had been used during World War II as a mess hall for prisoners of war. The building was subsequently used as a pesticide shop for 20 years between 1958 and 1978. During its operation as a pesticide shop, the building also housed a maintenance facility for lawn mowers, tractors, and other landscaping equipment. Releases of pesticides during this time were due to spills and the mishandling of pesticides and not due to the legal application of pesticides. Building 6621 was demolished, and the Site was re-graded in 1996 (NuTec, 1997). The Site is presently a 0.9 acre fenced-in lot with no permanent structures. The ground surface is an open grassed area.

This section discusses the chronology of events at the Site leading to the remedial action and the actions to involve the public in remedy selection in accordance with the NCP.

1.2 Chronology of Events

The following is a brief chronology of events associated with the Site:

Chronology of Events	
Date	**Event**
Approximately 1940s	Site was used as a mess hall
1958-1978	Site used as a pesticide shop
1996	Building 6621 was demolished
May 1997	Completion of Site Assessment and Risk Evaluation (NuTec, 1997)
2003 - 2010	Field sampling, including soil and groundwater investigations, completed in support of the Remedial Investigation (RI)
October 2011	Final RI Report including a Human Health Risk Assessment (ARCADIS, 2011)
July 2012	Final Focused Feasibility Study (FFS; ARCADIS, 2012a)
August 2012	Proposed Plan (PP; ARCADIS, 2012b)
September 2012	Final ROD (U.S. Army, 2012) issued
October 2012, March 2013, August 2013	Pre-excavation delineation and waste characterization sampling

Chronology of Events	
Date	**Event**
November 2013	Final RD (ARCADIS, 2013) issued
January 2014	Final RD Addendum (ARCADIS, 2014)
June 2014	Final ESD (U.S. Army, 2014)
December 2013 – June 2014	Implementation of excavation and emulsified vegetable oil (EVO) injections
September 2014	Draft RACR issued

A detailed summary of weekly Site activities conducted from December 2013 to June 2014 in support of implementation of the selected remedy is provided in **Table 1**.

2. Remedial Action Objectives

The Remedial Action Objectives (RAOs), as stated in the ROD (U.S. Army, 2012), are based on human health and environmental factors, and provided the basis for the formulation and development of the selected remedy. The RAOs for the selected remedy at the Site are as follows:

- Prevent human exposure to soil that would cause unacceptable risk to human health;
- Prevent human exposure to groundwater that would cause unacceptable risk; and
- To achieve maximum contaminant levels (MCLs) for the identified constituents of concern (COCs) in groundwater within a reasonable timeframe, thereby restoring groundwater to its beneficial use.

3. Remedial Action

An RD (ARCADIS, 2013) and an RD Addendum (ARCADIS, 2014) were developed to direct the implementation of the selected remedy. The selected remedy was implemented in accordance with the RD (ARCADIS, 2013) and RD Addendum (ARCADIS, 2014) from December 2013 – June 2014 and included the following components:

- Excavation and disposal of 1,726 tons of pesticide impacted soil comprised of 809 tons of non-hazardous soil with concentrations of chlordane greater than the Site Cleanup Level (SCL) of 16.21 milligrams per kilogram (mg/kg), 467 tons of hazardous soil with concentrations of chlordane less than 50 mg/kg, and 450 tons of hazardous soil with concentrations of chlordane greater than 50 mg/kg;

- Segregation and stockpiling of non-impacted material identified 4 to 8 feet (ft) below ground surface (bgs) as well as soil removed during the excavation of sidewalls constructed to facilitate excavation stability;

- Collection of confirmation soil samples from excavation sidewalls and stockpiled material;

- Backfill of the excavation with the non-impacted stockpiled soil (4 to 8 ft bgs layer and sidewall soil) and imported fill to achieve final grades;

- Dewatering of the excavation and treatment and discharge of containerized water;

- Installation of monitoring well (MW)-9 at the southeast corner of the intersection of York Avenue and Gordon Street;

- Abandonment and re-installation of MW-2R within the central portion of the excavation footprint;

- Completion of a baseline groundwater sampling event;

- Injection of 17,685 gallons of a 2 percent (%)EVO and 1% molasses solution at six injection points using a direct push drill rig; Site restoration; and

- Implementation of LUCs including engineering controls (i.e., retention of the existing chain link fence and installation of signage restricting uncontrolled and unauthorized intrusive activities) and institutional controls (i.e., inclusion of the

prohibition of residential land use and groundwater use at the Site in the FGGM Real Property Master Plan and the Installation Geographical Information System).

4. Demonstration of Completion – Removal Action Implementation

The following sections discuss the excavation activities that were completed in accordance with the RD (ARCADIS, 2013) and RD Addendum (ARCADIS, 2014). A summary of the weekly site activities is provided in **Table 1**. A photographic log documenting the excavation is presented in **Appendix A**.

4.1 Pre-Construction Activities

The implementation of the selected remedy was conducted under CERCLA; therefore, per Section 300.400(e) of the NCP, 40 CFR Section 300.400(e), no federal, state, or local permits were required for on-Site activities provided that the substantive requirements of these permits were met. Permit applications including a Stormwater Management Waiver Application and an Erosion and Sediment Control (E&SC) Plan were completed prior to mobilization and were included within the RD (ARCADIS, 2013). MDE's Federal Facility Division issued a final approval of the permit equivalent package on September 12, 2013. Documentation of the MDE's approval of the permit equivalent package is provided in **Appendix B**.

Prior to excavation, excavation control points were surveyed to demarcate the excavation grid as shown on **Figure 4**. The survey was performed by a Maryland licensed surveyor.

4.2 Mobilization and Site Preparation

Site preparation activities were initiated the week beginning December 2, 2013. Site preparation consisted of establishment of staging areas, tree removal, mobilizing equipment and materials, and installing safety protection devices (e.g., traffic controls, fencing, signs, cones, and markers).

Soil E&SCs were implemented in accordance with the Standards and Specification for Soil Erosion and Sediment Control in Maryland (MDE, 2011). All temporary E&SCs were in place prior to the initiation of earth disturbing activities. The E&SC measures and practices will remain in place until vegetation is established at the Site.

Pre-existing site conditions are depicted on Photos 1 and 2 of **Appendix A**. Additionally, components of site preparation activities including the stabilized construction entrance and E&SCs are depicted on Photos 3 and 4 of **Appendix A**.

An existing water line that traversed the northern portion of the planned excavation was temporarily decommissioned and removed to facilitate the remedial action. The water

line supplied water from the water main to a small dog kennel located adjacent to the eastern Site boundary. During excavation activities, bottled water was provided to the operator of the dog kennel. The remaining portions of the water line that were exposed at the excavation edges were capped to prevent infiltration of soil and groundwater within the line.

4.3 Excavation, Transportation, and Disposal of Waste

The following sections document the excavation, transportation, and disposal of waste from the Site. All aspects of the excavation were conducted in accordance with the regulations of 40 CFR 1926 Subpart P – Excavations and supervised by the excavation competent person.

4.3.1 Excavation

Excavation activities began on December 13, 2014 and continued through February 3, 2014. Intrusive activities were temporarily shut down from December 23, 2013 through January 5, 2014 to accommodate waste transport scheduling and the holiday season. During this hiatus, the excavation was secured and two separate runs of silt fence were installed around the perimeter of the excavation to prevent surface water from entering the excavation.

The vertical and horizontal limits of excavation were determined by previous investigations conducted and presented within the Final RD (ARCADIS, 2013) and were delineated to encompass soil containing concentrations of chlordane above the SCL of 16.21 mg/kg. The Site was partitioned with an alphanumeric grid that correlates soil from the Site to one of three waste streams: (1) non-hazardous waste containing concentrations of total chlordane above the SCL of 16.21 mg/kg and toxicity characteristic leaching procedure (TCLP) chlordane less than the TCLP threshold value of 0.03 milligram/liter (mg/L); (2) hazardous soil containing TCLP chlordane concentrations that exceed the TCLP threshold and total chlordane concentrations below 50 mg/kg; and (3) hazardous soil containing concentrations of TCLP chlordane that exceed the TCLP threshold and total chlordane concentrations that exceed 50 mg/kg. The dimensions of each grid were 10 ft x 10 ft x 4 ft (length:width:depth). Survey control of the excavation area was established to grid the Site and demarcate the corners of the excavation grid cells. Horizontal and vertical control of the excavation was maintained for the duration of the excavation and was implemented using a combination of techniques (e.g., survey stakes, spray paint, survey pole measurements, and string levels). Survey controls were reestablished following the completion of excavation within each 4 ft depth interval. Photo 5 through 8 of **Appendix A** depicts survey controls at the Site.

As specified in the RD Addendum (ARCADIS, 2014), excavation was conducted using an iterative approach that excavated and disposed of soil by the alphanumeric grid cells (refer to **Figure 4**) in an order of precedence determined by the relative concentrations of chlordane within a grid cell soil. The intent of this excavation sequence was to ensure that wastes were segregated and disposed of at the appropriate disposal facility (waste classification and disposal is discussed in Section 4.3. 3). This process was implemented to the extent practical and was modified as necessary to accommodate field conditions. If necessary, wastes with a similar classification (e.g., non-hazardous or hazardous) were segregated and stockpiled within the excavation to allow for continued load-out. Waste stockpiles within the excavation were lined with High Density Polyethylene (HDPE) sheeting and contained using metal sheeting to prevent cross contamination of nearby soils and maintain segregation of the waste streams.

The excavation was advanced vertically and horizontally until the planned excavation extent was achieved. In general, the limits of the excavation proceeded as planned with minor exception. Additional excavation was conducted at two locations south of the larger excavation (**Figure 4**), to remove non-hazardous soils identified subsequent to soil sampling conducted during the RI. Photos 9 and 10 of **Appendix A** depict the target areas following excavation and backfill. Deviations from the planned excavation limits are discussed in Section 4.3.2.

4.3.2 Excavation Expansion

Figure 4 depicts the originally planned horizontal and vertical extent of the excavation. However, the horizontal extent of the excavation at the 12-16 ft depth interval was expanded beyond its originally planned limits based upon the results of post-excavation confirmation samples. Discrete confirmation samples collected from the south and west sheer sidewalls of the 12-16 ft depth interval exceeded the SCL of 16,210 micrograms per kilogram (µg/kg) for chlordane. Therefore, the horizontal limits of excavation were extended two ft along the south and west sidewalls at this depth interval. Additional confirmation samples were collected to confirm the final limits of excavation have been attained. Confirmation sampling is discussed in more detail within Section 4.4.

Additional soil excavation was also conducted within grid cells that were originally not planned for excavation due to the visual appearance of purple stained soil (i.e., the purple staining was seemingly correlated to pesticide impacts noted in adjacent grid cells planned for excavation). Photos 11 and 12 of **Appendix A** depicted the purple stained soil identified in this area. Therefore, soil at the 4-8 ft interval originating from grid cell 1C and 1D (refer to **Figure 4**) were also excavated and disposed of. The

purple stained soil was conservatively assumed to be hazardous and impacted with chlordane concentrations greater than 50 mg/kg and disposed of accordingly.

4.3.3 Transportation and Disposal

A total of 69 truckloads were used to transport and dispose of approximately 1,726 tons of pesticide impacted soil comprised of 809 tons of non-hazardous soil and 917 tons of hazardous soil. Trucks leaving the Site were inspected, and truck tires and undercarriages were brushed off prior to leaving the Site. For trucks transporting hazardous soil, security tags were affixed to the truck tarp and secured. Excavation, material load-out, and soil management techniques are depicted in Photos 13 through 15 of **Appendix A**. Excavated material was transported in accordance with applicable international, federal, state, and local regulations. Waste disposal manifests for each waste stream are included as **Appendix C**.

The appropriate disposal facility was determined based on the results of waste characterization sampling. Waste characterization sampling methodology and results are summarized in the Final RD (ARCADIS, 2013). **Appendix D** provides the following:

- A Waste Disposal Notification documenting the types of waste anticipated to be generated, the selected disposal facility for each respective waste stream, and the approximate tonnage of each waste anticipated;
- The USEPA Off-Site Rule determination;
- Waste Profiles; and
- USEPA Acknowledgement of Consent letters for the export of hazardous waste.

The following table summarizes the three separate waste streams, the respective disposal facility accepting each waste, the treatment to be conducted prior to final disposal, and the tonnage disposed at each facility.

Waste Stream	Disposal Facility	Treatment	Actual Tonnage
Non-Hazardous Chlordane > SCL of 16.21 mg/kg TCLP chlordane < TCLP threshold 0.03 mg/L	King and Queen Sanitary Landfill, Little Plymouth, Virginia	No Treatment Required	809
Hazardous Chlordane < 50 mg/kg TCLP chlordane > TCLP threshold 0.03 mg/L	Stablex Canada Inc., Blainville, Quebec, Canada	Chemical Oxidation	467
Hazardous Chlordane > 50 mg/kg TCLP chlordane > TCLP threshold 0.03 mg/L	Bennett Environmental Inc., Récupère Sol, St-Ambroise-de-Chicoutimi, Quebec, Canada	Thermal Oxidation	450

4.3.4 Soil Stockpile Segregation, Sampling, and Disposal

As depicted in **Figure 4**, there existed a 4-ft layer of soil exhibiting chlordane concentrations below the SCL at 4.0 to 8.0 ft bgs consisting of the grids surrounding SB05 and SB06 (i.e., grid cells 1C through 4C and 1D through 4D). Purple stained soil was identified in grid cell 1C (4-8 ft bgs) and 1D (4-8 ft bgs). These grid cells were excavated and disposed of off-Site. The soils in the remaining grid cells, originating from this non-impacted 4.0 to 8.0 ft bgs interval, were temporary stockpiled on-Site to allow access for the continued excavation of the deeper impacted soils. This stockpiled soil was analyzed for total chlordane [Sample ID: S-SPC(4-8)] to confirm that the chlordane concentrations within the stockpiled soil were below the SCL prior to its reuse as backfill following completion of the excavation. Samples were submitted to ALS Environmental located in Middletown, Pennsylvania for analysis of total chlordane via USEPA Method 8270. Results of sample S-SPC(4-8) were below the SCL. Therefore, this material was suitable for reuse as backfill.

In addition, soils originating from the slope laybacks (necessary to ensure the stability of the excavation) were also stockpiled on-site and then sampled for total chlordane to confirm that the soil originating from the slope laybacks were below the SCL prior to reuse as backfill. Photos 17 and 18 depict soil stockpiles staged north and west of the excavation. There were three distinct slope layback stockpiles from soil originating from the north, east, and west sides of the excavation area. A slope layback was not necessary at the southern extent of the excavation due to the shallow depth of

excavation. Composite samples were collected from the slope layback stockpiles as follows:

- Sample N-SPC(0-4): the composite sample obtained from the north slope layback originating from the 0.0 to 4.0 ft bgs interval;
- Sample N-SPC(4-8): the composite sample obtained from the north slope layback originating from the 4.0 to 8.0 ft bgs interval;
- Sample E-SPC(0-8): the composite sample obtained from the east slope layback originating from the 0.0 to 8.0 ft bgs interval; and
- Sample W-SPC(0-8): the composite samples obtained from the west slope layback originating from the 0.0 to 8.0 ft bgs interval.

Composite samples obtained from the east and west slope layback stockpiles indicated that chlordane concentrations were below the SCL, and therefore suitable for reuse as backfill.

The composite sample [Sample N-SPC(0-4)] collected from the north layback stockpile (0-4 ft bgs) exhibited chlordane concentrations above the SCL. Thus, an additional five discrete samples [Samples N1-SPD(0-4) to N5-SPD(0-4)] were collected from the stockpile and analyzed of total and TCLP chlordane. Chlordane concentrations exceeded the SCL of 16.21 mg/kg in each of the five discrete samples; therefore soil originating from the north slope layback (0.0 to 4.0 ft bgs interval) were transported and disposed off-Site at the appropriate disposal facility in accordance with their TCLP and total chlordane results.

Soil stockpile sample results are presented in **Table 2**. Analytical lab reports are provided in **Appendix E**.

All stockpiled soil was placed on and covered with HDPE sheeting to prevent cross-contamination of soil. In addition, silt fence was placed around the perimeter of each stockpile to further prevent cross contamination of the Site.

4.3.5 Concrete Disposal

Concrete originating from the Former Building 6621 foundation was encountered during the remedial action. This material was temporarily segregated on polysheeting, decontaminated via brushing of bulk soil from the concrete, and then disposed of as non-hazardous waste (see Photo 16 of **Appendix A**). Approximately 41 tons of

concrete was disposed of at the King and Queen Landfill, Little Plymouth, Virginia, on February 20, 2014.

4.4 Post Excavation Confirmation Sampling

The following post excavation confirmation samples were collected:

- Eight discrete samples collected from sloped sidewalls at the 0-4 and 4-8 ft depth interval; and
- Ten discrete samples collected from the face of the sheer sidewalls at the 8-12 and 12-16 ft depth intervals.

Chlordane concentrations were observed below the SCL of 16,210 µg/kg in 8 of the 10 post excavation samples. The following sample locations exceeded the SCL:

- S-SWD(12-16): the post excavation sample originating from the south sidewall at the 12-16 ft bgs interval; and
- W-SWD(12-16): the post excavation sample originating from the west sidewall at the 12-16 ft bgs interval.

Therefore, the horizontal limits of excavation were extended two ft along the south and west sidewalls at the 12-16 ft depth interval, and these sidewalls were resampled. Chlordane results from the resampled locations [S-SWD(12-16)-RS01 and W-SWD(12-16)-RS01) exhibited chlordane concentrations below the SCL and therefore the final limits of excavation were attained.

Post excavation sample results are presented in **Table 2**. Analytical lab reports are provided in **Appendix E**.

4.5 Backfill and Site Grading

Following achievement of the vertical and horizontal excavation limits (February 3, 2014), the Site was backfilled utilizing the on-Site stockpiled soil with total chlordane concentrations less than the SCL and clean imported fill. Stockpiled Site soil was placed within the bottom of the excavation. Photos 19 and 20 of **Appendix A** depict the excavation following the placement of on-Site stockpiled soil and clean imported fill. When the depth of the excavation reached the entrance and exit location of the decommissioned water line, the pipe was reinstalled in a manner consistent with the applicable specifications and guidance provided by American Water (**Appendix F**).

Approximately 1,200 tons of imported fill was then placed to achieve final grades. Backfill was completed on February 10, 2014. Imported fill was analyzed for the following analytes prior to its use at the Site:

- Volatile Organic Compounds (VOCs) (USEPA Method 8260);
- Semi-Volatile Organic Compounds (USEPA Method 8270);
- Target Analyte List Metals (USEPA Method 6010B);
- Pesticides/Herbicides (USEPA Method 8081A); and
- Polychlorinated biphenyls (USEPA Method 8082B).

Results of the analysis were compared to the USEPA Residential and Industrial Screening Levels for Soils (analytical results are included in **Appendix E**). USEPA and MDE approved the soils for use as backfill via e-mail on December 19, 2013 (**Appendix G**). In addition, topsoil was analyzed for agricultural properties. Soil analytical and agricultural sample results are presented in **Appendix E** and **Appendix H**, respectively. Results of the testing indicate that the topsoil is suitable for its intended purpose.

Due to saturated site conditions following the placement of common borrow, the installation of top soil and grass seed was postponed until June 2014. The installation of the final 6 inches of topsoil, final grading, and site restoration were conducted June 9 through June 17, 2014. Grading of the Site was conducted to match the existing grades and to promote positive drainage. Photos 21 to 22 of **Appendix A** depict the final site grading and the installation of grass seed and straw matting.

4.6 Dewatering

Perched groundwater was encountered entering the excavation at approximately 8 ft bgs. Groundwater originating from the excavation was pumped and temporarily containerized in four 21,000 gallon frac tanks to allow the continued excavation, load-out of impacted soil, and backfilling of the excavation. Dewatering procedures consisted of the construction of a temporary sump to allow for the collection and pooling of groundwater and transfer of groundwater via a diesel powered pump and transfer hoses to the frac tanks. Photo 23 of **Appendix A** depicts the general layout of dewatering equipment. Approximately 78,000 gallons of groundwater were collected and temporarily containerized on-Site.

Two containerized water samples were collected for comparison purposes and included the following: (1) a sample collected directly from the frac tank using a bailer to characterize the constituent concentrations within containerized groundwater and (2) a grab sample collected after the containerized water passed through a granular activated carbon treatment system to demonstrate the efficacy of the filtration treatment system. These water samples were sent to ALS Environmental and were analyzed for the following parameters:

- VOCs via USEPA Method 8260;
- Total Petroleum Hydrocarbons (TPH) via USEPA Method 8015; and
- Pesticides via USEPA Method 8081.

A pre-fabricated treatment system was mobilized to the Site and utilized four-inline bag filters to remove suspended solids as a pre-treatment; followed by treating groundwater with two 500 pound in-line activated carbon vessels. The water treatment system was designed to treat groundwater for the COCs at the Site; specifically tetrachloroethene (PCE) and chlordane, and also for TPH. A determination was made to analyze the water samples for TPH as a faint sheen was visible on top of the containerized water and a faint petroleum odor was noted. PCE, alpha and gamma chlordane, gasoline range organics, and diesel range organics were detected at concentrations above their respective reporting limits in the influent (containerized water) sample. The treatment system design effluent concentration was 1.0 microgram per liter (µg/L) for both PCE and chlordane which is below the USEPA MCL of 5.0 µg/L for PCE and 2.0 µg/L for chlordane. Design specifications for the treatment system are provided in **Appendix I**.

Containerized groundwater was passed through the treatment system (refer to Photo 24 of **Appendix A**) and then discharged to a sanitary sewer line located immediately south of the Site (Photo 25 of **Appendix A**). The discharge of the treated water was conducted in accordance with the requirements (e.g., permissible flow rates, pre-treatment requirements, etc.) stipulated by the publicly owned treatment works operated by American Water. The MDE and USEPA were notified prior to discharge conducted on February 25 and 26, 2014 and concurred with the selected treatment system and discharge procedures. A summary of discharge quantities is provided in **Table 3**. Prior to demobilization of the frac tanks, each tank was cleaned and the remaining sediment/water at the bottom of the tanks was removed and transported to an approved off-Site disposal facility as discussed in Section 4.8.

4.7 Air Monitoring

Air monitoring was conducted during intrusive activities (i.e., material excavation and load out) to ensure the protection of on-Site worker health and safety. The air monitoring program included the following general components:

- On-Site monitoring for wind speed and direction using a wind sock;
- Continuous monitoring within the work zone for particulates using a DataRAM to quantify the particulate dust concentration generated during intrusive activities; and
- Continuous monitoring within the breathing zone for VOCs via a photoionization detector.

Logged data was downloaded daily and is provided in **Appendix J**.

4.8 Site Restoration and Demobilization

ARCADIS removed portions of the site access road leaving the crushed aggregate base, remaining construction materials (i.e., plywood, hay bales, and construction fencing and stakes), and heavy equipment and demobilized from the Site on February 20, 2014. Frac tanks containing water and sludge material were emptied, cleaned, and demobilized from the Site in April 2014. Sludge generated during cleaning procedures was containerized in vacuum boxes and transported and disposed of off-Site.

Grass seed and temporary erosion matting were installed to stabilize and re-vegetate the ground surface in June 2014. Prior to the placement of the grass seed, the remaining stone from the site access road was distributed evenly at the entrance gate and a 6-inch top soil layer was placed above the stone. Disturbed areas were seeded with a cool season mix of Tall Fescue, Kentucky Blue Grass, and Perennial Ryegrass, stabilized with straw, and then tackified. Following the completion of site restoration activities, the temporary Site access gate was returned to pre-existing conditions. In October 2014, additional grass seed was placed to address a small bare spot in the vicinity of the Site access gate. Additional seeding events may be scheduled, as necessary, to address any future bare areas. E&SCs remained in place through mid-November 2014.

4.9 Deviations from Remedial Design

This section identifies components of the selected remedy for impacted soil (i.e., activities and materials) that deviated from the RD (ARCADIS, 2013) and RD

Addendum (ARCADIS, 2014). Deviations are described in additional detail where appropriate within this report and are listed below for reference purposes:

- Excavation Expansion – As discussed in Section 4.3 additional soil excavation was conducted due to the following: visual observation of stained soils; confirmation sample results; and north slope layback soil stockpile sample results. The additional excavation of soil accounted for approximately an additional 180 tons of soil disposed off-site.

- Concrete Excavation and Off-Site Disposal – portions of the concrete foundation of former building 6621 were encounter during the excavation activities. The concrete foundation was chipped in place, segregated; dry decontaminated to remove bulk soil, and then subsequently disposed of as non-hazardous waste at the King and Queen Landfill, Virginia.

- Schedule – The remedial action, as specified in the RD, was anticipated to be conducted over a 33-day duration. However, due to weather complications and unforeseen site conditions, the complete remedial action (i.e., excavation, injections, and Site restoration) was conducted over a six month period (December 2013 to June 2014).

The deviations documented above do not conflict with the intent of the approved RD. Rather, these deviations from the RD were implemented to address observed field conditions, assure the continued health and safety of site workers, and to extend the selected remedy to a greater portion of the excavation area.

5. Demonstration of Completion - Groundwater Remedy Implementation

The following subsections summarize the implementation of the groundwater remedy at FGGM 13. Implementation of the groundwater remedy included installation of two monitoring wells, completion of a baseline groundwater sampling event, and carbohydrate substrate injections.

5.1 Groundwater Monitoring Well Installation

In accordance with the selected remedy detailed in the ROD (U.S. Army, 2012), a new monitoring well (MW-9) was installed downgradient of MW-2R at the southeast corner of York Avenue and Gordon Street. Additionally, MW-2R was abandoned prior to intrusive activities at the Site and was reinstalled at its original location following completion of excavation and backfill activities. Well installation was conducted on February 24, 2014 by a Maryland licensed driller with oversight from an ARCADIS geologist. Split spoon samples were collected at five ft intervals from 15 – 30 ft bgs during installation of MW-2R and MW-9. Clay was encountered at approximately 25 ft bgs at MW-9 and soil lithology was consistent with the geology identified during installation MW-2R, thus confirming that the shallow subsurface at the Site is comprised of Lower Patapsco sands underlain by a clay layer as presented in the conceptual site model developed in the FFS (ARCADIS, 2012a). Well development was conducted 24-hours following well installation to ensure removal of fine grained sediments from the well screen.

Well installation activities are depicted in Photos 26 and 27 of **Appendix A**. Field forms including well construction diagrams, soil boring logs, and well development logs are provided in **Appendix K**.

5.2 Baseline Sample Results

A baseline groundwater sampling event was conducted on February 24 – 25, 2014 and March 5, 2014. Samples were collected from nine monitoring wells (MW-1R, MW-2R, MW-3R, MW-4R, MW-5, MW-6, MW-7, MW-8, and MW-9) using low-flow sample methodology. Prior to conducting groundwater sampling, each monitoring well was gauged and depth to water and total sounded depth measurements were recorded. Groundwater elevation measurements are presented in **Table 4** and on **Figure 5.** Groundwater samples were submitted to ALS Environmental located in Middletown, Pennsylvania and analyzed for pesticides and VOCs via USEPA method 8270D and 8260, respectively. Additionally, MW-2R, located within the ERD treatment area, was sampled for dissolved gasses (e.g. methane, ethane, and ethene) via method RSK175 and dissolved organic carbon via USEPA method 9060. Monitoring well locations are

provided on **Figure 5** and detected parameters are summarized in **Table 5**. Analytical reports and field forms are provided in **Appendix E** and **Appendix K**, respectively.

5.3 Injection Event

In accordance with the RD (ARCADIS, 2013), ERD technology was implemented to address VOCs in groundwater through the completion of an injection event delivering 17,685 gallons of a 2% EVO and 1% molasses solution into the aquifer. Specifically, injections were conducted to target PCE and trichloroethene in groundwater at concentrations that exceed SCLs as presented in the ROD (U.S. Army, 2012). The MDE approved the injection of EVO and molasses on February 26, 2014; the approval letter is contained within **Appendix L**. Injections were conducted March 10 – 14, 2014, by Vironex with oversight by ARCADIS personnel.

The injections utilized a direct-push method at six injection points located along two transects aligned perpendicular to groundwater flow (refer to **Figure 6**). At each injection point, injection depths consisted of three injection intervals beginning approximately at the water table, encountered at approximately 17 ft bgs at MW-2R, and spaced vertically every 5 ft between approximately 18 and 23 ft bgs. A brief injection test was performed during the injection process to verify design parameters and to determine working injection pressures. At several locations, due to subsurface heterogeneity, resistance to flow was encountered and injection points were offset by several feet from the targeted injection depth in order to achieve the planned injection volume. The injection volume for any interval where resistance was encountered was injected above and below the target interval that was providing high resistance; thus, an equivalent volume of EVO and molasses was injected directly adjacent to the target interval. A comprehensive summary of the injection event including total volumes and intervals where resistance and surfacing of the injection solution was encountered is provided in the field forms presented in **Appendix K**.

Two temporary piezometers were installed adjacent to one injection point within the designed injection radius of 10 ft to monitor water quality parameters, water levels, and visual observations of breakthrough of the injection solution during the injections. In addition, groundwater samples were collected from the two temporary piezometers and from MW-2R and analyzed for dissolved organic carbon (DOC) and total organic carbon (TOC) to confirm that a 10 ft radius of influence has been attained per the RD. The DOC and TOC results (presented in **Table 5**) indicate that the radius of influence was attained and that dissolved and total carbon levels are sufficient to establish an in-situ reactive zone and promote ERD. A summary of injection quantities is provided in **Table 6**. The injection layout including injection points, temporary piezometers, and

injection trailer are depicted on Photos 28 and 29 of **Appendix A**. Analytical laboratory reports are provided within **Appendix E**. Injection logs are provided in **Appendix K**.

Additional injections may be required to achieve groundwater SCLs. The annual long term monitoring reports, to be prepared at the end of each calendar year, will evaluate the data and assess as to whether additional injections are warranted.

5.4 Long term Monitoring and Performance

Following implementation of the groundwater remedy at the Site in March 2014, long term monitoring was initiated in accordance with the program outlined in the RD (ARCADIS, 2013). Site wide groundwater sampling events were conducted quarterly in June 2014, September 2014, and October 2014. Field activities and analytical results associated with each sampling event were presented in separate letters titled Second Quarter 2014 Groundwater Monitoring Results (ARCADIS, 2014b), Third Quarter 2014 Groundwater Monitoring Results (ARCADIS, 2014c), and Fourth Quarter 2014 Groundwater Monitoring Results Annual Data Review (ARCADIS, 2014d) and dated October 27, 2014, November 4, 2014, and December 12, 2014, respectively. In addition to presenting the fourth quarter analytical results the Fourth Quarter 2014 Monitoring Results letter also presents data trends since remedy implementation, and discusses future actions at the Site.

It is noted in the Fourth Quarter 2014 Monitoring Results letter (ACRADIS, 2014d), that methane concentrations within MW-2R increased concurrent to the consumption of dissolved organic carbon which is indicative of a viable microbial community able to support ERD. Furthermore, the concentrations of PCE exhibited a strong decline following EVO injection and overall the concentration of PCE within MW-2R decreased when compared to baseline conditions, while the degradation byproduct cis-1,2-DCE increased. Therefore, CVOC data trends and performance monitoring results collected during 2014 indicate that the March 2014 injection event was successful in establishing an in-situ reactive zone, as indicated in the RD (ARCADIS, 2013), and in which reductive dechlorination of PCE and TCE is favorable in the vicinity of the Former Pesticide Shop (i.e. MW-2R).

5.5 Deviations from the Remedial Design

This section identifies components of the selected remedy for groundwater (i.e., activities and materials) that deviated from the RD (ARCADIS, 2013) and RD Addendum (ARCADIS, 2014). Deviations are described in additional detail where appropriate within this report and are listed below for reference purposes:

- Installation of MW-9 – Due to the complex utility corridor at the proposed location for MW-9 (as depicted within the RD), MW-9 was installed approximately 60 ft downgradient of the location proposed in the RD to avoid the potential for a utility strike during well installation.

- Injection Substrate – The EVO substrate selected in the RD for implementation of the full-scale injection event was Remediation Natural Attenuation Services, Inc. Newman Zone EVO containing approximately 50% oil by volume and 4% lactate by weight. However, the actual substrate used was a combination of EVO and molasses and was selected because it delivered more EVO (60% oil by volume) into the aquifer and was determined to be more efficient substrate than the Newman Zone EVO. The material specification for the selected EVO substrate is provided in **Appendix H**.

6. Demonstration of Completion – Land Use Controls

In addition to the active components of the remedial action (i.e., excavation and chemical injections), existing LUCs, including institutional controls (ICs) and engineering controls (ECs), at FGGM 13 were maintained and enhanced. ICs are administrative measures put in place to restrict human activity, in order to control future land use. ECs include a variety of engineered or constructed barriers to control human activity and restrict groundwater use. The LUC boundaries for the Site are shown on **Figure 7**.

As discussed in the RD (ARCADIS, 2013), a number of the ICs specified in the ROD (U.S. Army, 2014a) to achieve RAOs are already in place as elements of required procedures at FGGM (i.e. regulation of intrusive activities through the FGGM Dig Permit requirements; Master Plan Regulations including the prohibition of residential land use and groundwater use at the Site; and the documentation of the Site boundaries in the FGGM Geographic Information System Database). The remaining ICs were implemented through completion of the annual site inspection which was conducted in October 2014 (refer to **Section 6.1** below) to establish that all on-Site LUCs are in good condition and to confirm that the land use of the Site has not changed.

ECs identified in the ROD (US Army, 2014a) to be implemented at the Site included the installation of signs prohibiting unauthorized intrusive activities at the Site. Six LUC signs were installed utilizing steel u-channel posts on October 2, 2014 at the locations depicted on **Figure 7**. All signage was approved by the U.S. Army and remained consistent with LUCs installed at other FGGM sites. Photo documentation of LUC sign installation is provided in Photo 30 through Photo 35 of **Appendix A**.

6.1 Annual Inspection Findings

As indicated in the ROD (U.S. Army, 2012), annual site inspections are required to (1) document that LUC signs are in place and in good condition and (2) confirm that land use has not changed at the Site. On October 16, 2014, a brief site inspection was conducted and confirmed that the LUC signs were installed properly and remained in new condition. Furthermore, the land use at the Site remained unchanged and is currently under the operation of the Department of Emergency Services at Fort George G. Meade. Documentation of the site inspection is included in **Appendix K**.

7. Ongoing Activities

As indicated in the RD (ARCADIS, 2013), additional injections may be conducted after two years, as necessary, if COC degradation is less than anticipated. At this time, only three quarterly sampling events have been conducted since remedy implementation, therefore, the timing of a second injection event will be dependent upon the results of additional quarterly and semi-annual sampling events conducted during 2015.

Long term groundwater monitoring will continue in accordance with the selected remedy presented in the ROD (U.S. Army, 2012) and as outlined in the RD (ARCADIS, 2013). Quarterly monitoring will be conducted at all Site monitoring wells (**Figure 5**) for one year following remedy implementation (second quarter of 2014 through first quarter of 2015) Following completion of quarterly monitoring, monitoring will be conducted semi-annually for two years and annually thereafter. As discussed in Section 5.4, 2014 groundwater analytical results were presented in documents separate from this report. Future long term monitoring data will be reported in a similar manner subsequent to each sampling event. Comprehensive data evaluations will be conducted and reported annually prior to the end of each calendar year. Additional on-going activities include annual land use control inspections and CERCLA 5-year reviews.

8. Community Relations

In accordance with the NCP, public participation is required to promote active communication between the communities affected by activities conducted at the Site. This public participation requirement of the NCP has been fulfilled by the U.S. Army in the following manner:

- Fact Sheets – A fact sheet was prepared and distributed in November 2013. This fact sheet summarized the site history, current site conditions, and the proposed removal action. In addition, the fact sheet informed the community of pertinent contact information and the locations of the information repository available for public review.

- Restoration Advisory Board (RAB) Meetings – Presentations were conducted at RAB meetings on September 20, 2012 and January 16, 2014 to provide details pertaining to implementation of the remedy and updates to the proposed schedule. Bi-monthly RAB meetings provide an opportunity for community members (including elected RAB members) and representatives of government agencies to meet and exchange information about FGGM's environmental program.

- Public Comment Period – A public notice was published in the *Capital Gazette* (a local newspaper) on August 1, 2012, and in SoundOff (weekly FGGM newspaper) on August 9, 2012, announcing the availability of the PP for public review and comment during the public comment period from August 8 to September 7, 2012. Additionally, a public meeting was held on August 15, 2012, to provide an opportunity for the public to comment on the proposed remedial actions documented in the PP. An additional public notice was published in the *Capital Gazette* and SoundOff in October 2012 announcing the availability of the signed ROD for public review.

- Information Repositories – The Administrative Record for the Site including documents pertaining to FGGM 13 (i.e., FFS, PP, ROD) is located at two information repositories established by FGGM. The repositories are accessible in accordance with the American Disabilities Act, have copy facilities, and are available to the community during normal business hours. Information repositories are maintained at the following locations: Anne Arundel County Public Library – West County Library (1325 Annapolis Road, Odenton, Maryland 21113) and the Fort Meade Environmental Division office (4215 Roberts Avenue, Suite 320, Fort Meade, Maryland). Additionally, electronic copies of pertinent Site documents are provided on the FGGM Environmental Management System website available at

the following path: http://www.ftmeade.army.mil/environment/ (Select Clean-up Program from the menu on the left hand side of the webpage).

9. Certification Statement

This RACR memorializes the completion of the RA and achievement of the RAOs at FGGM 13, Former Pesticide Shop, FGGM, Maryland. All components of the remedial action were implemented pursuant to CERCLA, and as documented in the ROD (U.S. Army, 2012).

5 Feb 15

Brian P. Foley
Colonel, Signal Corps, Commanding

Date

2/25/15

Lori Reynolds, Office Director (Acting)
Office of Federal Facility Remediation and Site Assessment
United States Environmental Protection Agency, Region III

Date

10. References

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Tables

Table 1
Summary of Weekly Activities
Remedial Action Completion Report
FGGM 13 Former Pesticide Shop, Building 6621
Fort George G. Meade, Maryland

Date	Summary of Site Activities
November 25 - 29, 2013	1. Site preparation activities including utility mark out. 2. Tree removal.
December 2 - 6, 2013	1. ARCADIS construction crew mobilized to Site. 2. Installation of silt fence, access road, and orange snow fencing at limits of disturbance. 3. Reconfigured chain-linked fence and installed gate along Gordon Street. 4. Spray painted excavation grid on ground surface. 5. Moved large landscaping boulders to allow Site access.
December 9 - 13, 2013	1. Installed traffic controls. 2. Excavated, transported, and disposed of 1 non-hazardous load and 2 hazardous loads beginning in the northwest corner of the excavation. 3. Identified concrete slab foundation from foot print of Building 6621. 4. Stockpiled concrete and covered with poly sheeting.
December 16 - 20, 2013	1. Cut and capped water line running east-west from York Avenue to the dog kennel located west of the excavation. 2. Excavated, transported, and disposed of 2 non-hazardous loads, 7 hazardous loads. 3. Constructed north sidewall. Stockpiled material and covered with poly sheeting. 4. Collected post excavation confirmation samples: N-SWD(0-4), N-SWD(4-8), N-SPC(0-4), and N-SPC(4-8). 5. Partial lay backs and fine grading of existing lay backs conducted, as appropriate, to facilitate excavation stability. 6. Groundwater identified entering the excavation at 8 feet below ground surface from the north east corner of the excavation. 7. Prepared Site for excavation hiatus.
December 23 - 27, 2013	1. No Site activities due to inclement weather and the winter holidays.
December 30, 2013 - January 3, 2014	1. Frac tank delivered. 2. Sump installed within the excavation at 8 feet below ground surface. 3. Began dewatering in preparation of trucking activities the week of January 6 - 10, 2014. 4. Removed tree. 5. No trucking activities.
January 6 - 10, 2014	1. Remobilized to Site. 2. Excavated, transported, and disposed of 11 non-hazardous loads and 17 hazardous loads. 3. Collected discrete confirmation samples from north sidewall stockpile. 4. Continued pumping groundwater and surface water run-on from the excavation to on-Site frac tanks. 5. Partial lay backs and fine grading of existing lay backs conducted, as appropriate, to facilitate excavation stability. 6. Collected post excavation confirmation samples: N1-SPD (0-4), N2-SPD (0-4), N3-SPD (0-4), N4-SPD (0-4), and N5-SPD (0-4).
January 13 - 17, 2014	1. Gauged monitoring wells. 2. Collected sample from frac tank and conducted "proof of concept" evaluation and sampling. 3. Constructed west (0-8) and east (0-4) sidewalls. 4. Collected post excavation confirmation samples: E-SWD(0-4), S-SWD(0-4), W-SWD(0-4), W-SWD(4-8) and W-SPC. 5. On-going dewatering activities.
January 20 - 24, 2014	1. Excavated, transported, and disposed of 7 non-hazardous loads and 2 hazardous loads. 2. Envirotech delivered water treatment system. 3. Prepared excavation for excavation at deeper depth intervals. 4. Collected post excavation confirmation samples: S-SPC(4-8), E-SWD(4-8), and S-SWD(4-8). 5. On-going dewatering activities.
January 27 - 31, 2014	1. Excavated, transported, and disposed of 8 non-hazardous loads and 9 hazardous loads. 2. Collected post excavation confirmation samples: N-SWD(8-12), E-SWD(8-12), S-SWD(8-12). W-SWD(8-12), N-SWD(12-16), E-SWD(12-16), S-SWD(12-16). W-SWD(12-16), and E-SPC. 3. Collected post-treatment water sample. 4. Expanded horizontal limits of 12-16 foot interval and resampled W-SWD(12-16) and S-SWD(12-16). 5. On-going dewatering activities.
February 3 - 7, 2014	1. Excavated, transported, and disposed of 3 non-hazardous loads and 1 hazardous loads. 2. Began backfilling activities using available stockpiled material from lay backs.
February 10 - 14, 2014	1. Continued backfill activities. 2. Transported and disposed of 2 non-hazardous loads and 1 hazardous loads from north sidewall stockpile and hot spot excavations near access road.
February 17 - 21, 2014	1. Completion of utility locate procedures at MW-9 and MW-2R in preparation of well installation. 2. Survey of MW-2R location. 3. Replacement and pressure testing of water line. 4. Prepared concrete for off-Site disposal. 5. Transported and disposed of 2 non-hazardous loads of concrete. 6. Began removal of access road.

Table 1
Summary of Weekly Activities
Remedial Action Completion Report
FGGM 13 Former Pesticide Shop, Building 6621
Fort George G. Meade, Maryland

February 24 - 28, 2014	1. Vacuum excavation to 8 - feet below ground surface in support of MW-9 installation. 2. Installation of MW-2R and MW-9. 3. Collection of baseline groundwater samples. 4. Well development activities at MW-2R and MW-9. 5. Treatment and discharge of containerized water.
March 3 - 7, 2014	1. Completion of baseline groundwater monitoring at MW-2R and MW-9. 2. Installation of temporary piezometers for implementation of emulsified vegetable oil/molasses injections.
March 10 - 14, 2014	1. Implementation of emulsified vegetable oil/molasses injections. 2. Vironex demobilized from the Site.
March 17 - 28, 2014	1. No Site activities scheduled.
March 31 - April 4, 2014	1. Sludge boxes delivered to facility cleaning of frac tanks on-Site.
April 7 - April 11, 2014	1. Frac tanks cleaned. Waste generated containerized in sludge boxes for off-Site disposal.
April 14 - June 6, 2014	1. No Site activities scheduled.
June 9 - 13, 2014	1. Envirotech on-Site to complete site restoration activities: fine grading, installation of top soil layer, seeding, application of fertilizer, and installation of erosion matting.
June 16 - 20, 2014	1. Envirotech on-Site to complete site restoration activities: installation of erosion matting, placement of landscaping boulders along Gordon Street and modifications to silt fence. 2. DTCI on-Site to install manhole vault at MW-2R. 3. LongFence on-Site to reinstall chain link fence and gate along Gordon Street.
June 23 - 27, 2014	1. KCI on-Site to survey MW-9 and MW-2R. 2. LongFence on-Site to reinstall chain link fence and gate along Gordon Street.

Table 2
Post Excavation Confirmation Results
Remedial Action Completion Report
FGGM 13 Former Pesticide Shop, Building 6621
Fort George G. Meade, Maryland

Depth Interval (ft)	Sample ID	Analyte:	Total Chlordane[1]	TCLP Chlordane[1]
		Units:	µg/kg	µg/L
		Sample Date		
Side Wall				
0-4	N-SWD (0-4)	12/17/2013	14,200	---
	E-SWD (0-4)	1/13/2014	17.3 U	---
	S-SWD (0-4)	1/13/2014	2,530	---
	W-SWD (0-4)	1/13/2014	17.1 U	---
4-8	N-SWD (4-8)	12/18/2013	115 J	---
	E-SWD (4-8)	1/21/2014	167	---
	S-SWD (4-8)	1/21/2014	177	---
	W-SWD(4-8)	1/13/2014	45.3	---
8-12	N-SWD(8-12)	1/27/2014	7,500	---
	E-SWD(8-12)	1/28/2014	4,600	---
	S-SWD(8-12)	1/28/2014	6,520	---
	W-SWD(8-12)	1/27/2014	34.2	---
12-16	N-SWD(12-16)	1/27/2014	25.3 J	---
	E-SWD(12-16)	1/27/2014	61	---
	W-SWD(12-16)	1/28/2014	**39,100**	---
	W-SWD(12-16)-RS01	1/30/2014	7,900	---
	S-SWD(12-16)	1/28/2014	**27,200**	---
	S-SWD(12-16) - RS01	1/30/2014	738	---
Stockpile				
0-4	N-SPC (0-4)	12/17/2013	**32,600**	---
	N1-SPD (0-4)	1/6/2014	**22,200**	23.5
	N2-SPD (0-4)	1/6/2014	**20, 000**	28.6
	N3-SPD (0-4)	1/6/2014	**16,700**	**35.2**
	N4-SPD (0-4)	1/6/2014	**39,400**	**41**
	N5-SPD (0-4)	1/6/2014	**44,200**	**71.2**
4-8	N-SPC (4-8)	12/18/2014	88.4 U	---
	S-SPC (4-8)	1/21/2014	5,660	---
0-8	E-SPC (0-8)	1/27/2014	374	---
	W-SPC (0-8)	1/13/2014	2,300	---

Notes:

1. Concentrations exceeding the site clean up level for total chlordane (16,210 µg/kg) or the TCLP threshold for chlordane (0.03 mg/L), as applicable, are shaded and bolded.

--- - Not Analyzed
µg/kg - microgram per kilgram
µg/L - microgram per liter
E - east
ft - feet
J - Indicates an estimated result.
N - north
RS - Indicates location was resampled following additional excavation.
S - south
SPC - Stockpile Composite
SPD - Stockpile Discrete
SWD - Sidewall Discrete
TCLP - Toxicity Characteristic Leaching Procedure
U - Anlyate was analyzed but was not detected above reporting limits
W - west

Table 3
Treated Water Discharge Summary
Remedial Action Completion Report
FGGM 13 Former Pesticide Shop, Building 6621
Fort George G. Meade, Maryland

Date	Time	Run Time (minutes)	Influent Pressure	Flowmeter Reading (gallons)	Volume (gallons)[1]	Average Flow Rate (gpm)
Start: 2/25/14	10:45	0	10 psi	20,600,909	0	----
	12:00	75	10 psi	20,605,842	4,933	66
	13:00	135	10 psi	20,609,124	8,215	55
	14:00	195	10 psi	20,612,627	11,718	58
	15:00	255	10 psi	20,616,504	15,595	65
	16:00	315	10 psi	20,619,742	18,833	54
	17:00	375	10 psi	20,622,924	22,015	53
	18:00	435	10 psi	20,626,270	25,361	56
	19:00	495	10 psi	20,629,678	28,769	57
	20:00	555	10 psi	20,632,965	32,056	55
	21:00	615	10 psi	20,636,400	35,491	57
	22:00	675	10 psi	20,639,880	38,971	58
	23:00	735	10 psi	20,643,215	42,306	56
Start: 2/26/14	0:00	795	10 psi	20,646,565	45,656	56
	1:00	855	10 psi	20,649,900	48,991	56
	2:00	915	10 psi	20,653,325	52,416	57
	3:00	975	10 psi	20,656,628	55,719	55
	4:00	1035	10 psi	20,659,930	59,021	55
	5:00	1095	10 psi	20,663,440	62,531	59
	6:00	1155	10 psi	20,666,740	65,831	55
	7:00	1215	8 psi	20,668,740	67,831	33
Stop	7:10	1215	0 psi	20,668,823	67,914	NR
Restart	8:15	1215	10 psi	20,668,823	67,914	NR
Stop	9:00	1260	8 psi	20,671,192	70,283	53
Restart	11:00	1260	10 psi	20,671,192	70,283	NR
	11:20	1280	10 psi	20,672,810	71,901	81
Stop	11:50	1310	8 psi	20,674,026	73,117	41

Notes:
1. An additional 5,000 gallons of of sludge/water was removed from the frac tanks during cleaning operations.
gpm - gallons per minute
NR - Not Recorded

Table 4
Well Construction Details and Groundwater Elevation Data
Remedial Action Completion Report
FGGM 13 Former Pesticide Shop, Building 6621
Fort George G. Meade, Maryland

Well ID	Northing[1]	Easting[1]	Measuring Point Elevation[2] (ft msl)	Screened Interval (ft bgs)	Screen Length (ft)	Total Depth (ft bgs)	12/18/2013[3]		2/25/2014[4]	
							Depth to Water (ft bmp)	GW Elevation (ft msl)	Depth to Water (ft bmp)	GW Elevation (ft msl)
MW-1R	521751.5	1383627.8	171.20	13.5-23.5	10	23.5	19.68	151.52	19.54	151.66
MW-2R	521722.4	1383924.8	159.38	20 - 30	10	30	NM	NM	17.24	142.14
MW-3R	521714.7	1384059.9	154.80	17 - 27	10	27	NM	NM	17.79	137.01
MW-4R	521556.2	1384117.1	155.54	20 - 30	10	30	19.99	135.55	18.93	136.61
MW-5	521847.0	1384202.1	154.36	24.31 - 34.31	10	35	18.69	135.67	17.71	136.65
MW-6	521752.3	1384616.5	139.49	14.40 - 24.40	10	25	NM	NM	5.88	133.61
MW-7	521718.1	1384897.6	136.10	11.89 - 21.89	10	23	NM	NM	3.75	132.35
MW-8	521040.3	1384822.0	135.86	12.05 - 22.05	10	24	NM	NM	4.97	130.89
MW-9	521686.3	1384249.6	148.80	20 - 30	10	30	NM	NM	12.32	136.48

Notes:

(1) Horizontal coordinates: NAD 83/10, Maryland, US Feet.

(2) Vertical elevations: NAVD 1988, US Feet.

3. Select monitoring wells gauged in support of excavation activities.

4. All monitoring wells were gauged on February 25, 2014, with the exception of MW-2R and MW-9 which were gauged March 5, 2014.

ft bgs - feet below ground surface

ft bmp - feet below measuring point

ft msl - feet above mean sea level

GW - groundwater

NS - not sampled

NM - not measured

Table 5
Baseline Groundwater Monitoring Results - Detected Parameters
Remedial Action Completion Report
FGGM 13 Former Pesticide Shop, Building 6621
Fort George G. Meade, Maryland

		Sample Location	MW-1R	MW-2R	MW-2R	MW-3R	MW-4R	MW-5	MW-6	MW-7	MW-8	MW-9	PZ-1	PZ-2	Batch[3]
		Screened Interval (ft bgs)	13.5 - 23.5	20 - 30	20 - 30	17 - 27	20 - 30	24.3 - 34.3	14.4 - 24.4	11.9 - 21.9	12.1 - 22.1	20-30	20 - 30	20 - 30	20 - 30
		Measuring Point Elevation (ft msl)	171.2	159.38	159.38	154.8	155.54	154.36	139.49	136.1	136.09	148.8	---	---	---
		Sample Date	2/24/2014	3/5/2014	3/14/2014	2/24/2014	2/24/2014	2/24/2014	2/25/2014	2/25/2014	2/25/2014	3/5/2014	3/14/2014	3/14/2014	3/14/2014
Constituents	**SCL**	**Units**													
Volatile Organic Compounds															
MIBK	---	µg/L	ND	ND	---	ND	ND (ND)	ND	ND	ND	ND	0.46 J	---	---	---
1,1,1,2 - Tetrachlorethane	---	µg/L	ND	ND	---	ND	ND (ND)	ND	ND	0.86 J	ND	ND	---	---	---
Tetrachloroethene	5	µg/L	ND	**104**	---	0.52 J	1.7 (1.8)	ND	ND	ND	ND	2.4	---	---	---
Trichloroethene	5	µg/L	ND	2.7	---	ND	ND (ND)	ND	ND	ND	ND	ND	---	---	---
Pesticides															
alpha-BHC	---	µg/L	ND	0.19	---	ND	ND (ND)	ND	ND	ND	ND	ND	---	---	---
delta-BHC	---	µg/L	ND	0.053 J	---	ND	ND (ND)	ND	ND	ND	ND	ND	---	---	---
gamma-BHC	0.2	µg/L	ND	**10.9**	---	0.098 J	0.034 J (0.035 J)	ND	ND	ND	ND	0.021 J	---	---	---
alpha-Chlordane	2	µg/L	ND	1.9 J	---	0.21	0.31 (0.33)	ND	ND	ND	ND	0.14 J	---	---	---
gamma-Chlordane	2	µg/L	ND	1.3 J	---	0.35	ND (ND)	ND	ND	ND	ND	0.12 J	---	---	---
4,4'-DDD	---	µg/L	ND	0.36	---	ND	ND (ND)	ND	ND	ND	ND	ND	---	---	---
4,4'-DDT	---	µg/L	ND	0.45	---	ND	ND (ND)	ND	ND	ND	ND	ND	---	---	---
Dieldrin	---	µg/L	ND	0.38	---	ND	0.24 (0.27)	ND	ND	ND	ND	ND	---	---	---
Endosulfan Sulfate	---	µg/L	ND	ND	---	ND	ND (0.022 J)	ND	ND	ND	ND	ND	---	---	---
Heptachlor	0.4	µg/L	ND	0.16 J	---	ND	ND (ND)	ND	ND	ND	ND	ND	---	---	---
Biogeochemical Parameters															
Ethane	---	µg/L	---	ND	---	---	---	---	---	---	---	---	---	---	---
Ethene	---	µg/L	---	ND	---	---	---	---	---	---	---	---	---	---	---
Methane	---	µg/L	---	2	---	---	---	---	---	---	---	---	---	---	---
Dissolved Organic Carbon	---	mg/L	---	5	43	---	---	---	---	---	---	---	1030	1240	4440
Total Organic Carbon	---	mg/L	---	---	73.9	---	---	---	---	---	---	---	2450	902	10800

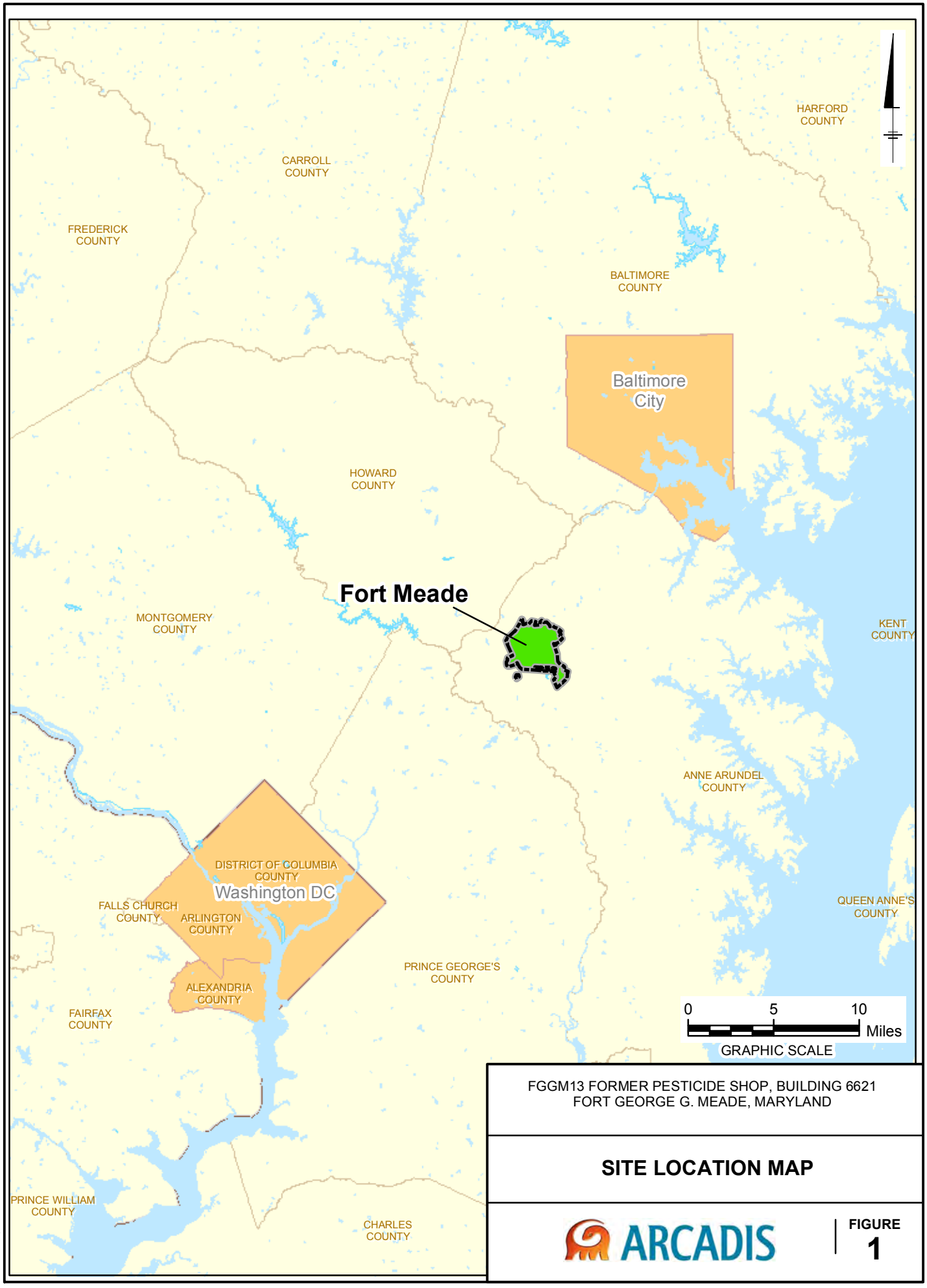
Notes:
1. Values exceeding the applicable screening criterion are boldfaced and shaded.
2. Duplicate results are presented adjacent to parent results in parenthesis.
3. The batch sample ("Batch") was collected from the mixed injection solution.
--- - Not applicable
µg/L - micrograms per liter
mg/L - milligrams per liter
ft bgs - feet below ground surface
ft msl - feet mean seal level
J - Indicates an estimated concentration.
ND - Analyte was not detected above reporting limits.
MIBK - Methyl t-Butyl Ether 4-Methyl-2-Pentanone
DDD - Dichlorodiphenyldichloroethane
DDT - Dichlorodiphenyltrichloroethane

Table 6
Injection Quantity Summary
Remedial Action Completion Report
FGGM 13 Former Pesticide Shop, Building 6621
Fort George G. Meade, Maryland

Injection Point	Total Molasses Injected (gal)	EVO Injected (gal)	Water Injected (gal)	Amended Solution Injected (gal)
IP-1	66	85	4,137	4,285
IP-2	32	41.5	2,023	2,096
IP-3	42.6	54.8	2,674	2,770
IP-4	45.5	59.3	2,875	2,978
IP-5	42.6	55	2,678	2,775
IP-6	42.6	55.2	2,684	2,781
Total:	271	351	17,071	17,685

Notes:
1. Injections were completed March 10 - 14, 2014 by Vironex with oversight from ARCADIS field personnel.
2. The amended solution (2% EVO and 1% molasses) was injected at three discrete depth intervals via direct push injection points: 18 - 23, 23 - 28, and 28 - 33 feet below ground surface.
IP - injection point
gal - gallons
EVO - emulsified vegetable oil

Figures



FGGM13 FORMER PESTICIDE SHOP, BUILDING 6621
FORT GEORGE G. MEADE, MARYLAND

SITE LOCATION MAP

ARCADIS

FIGURE 1

CITY: MPLS DIV/GROUP: IM DB: MG
FORT GEORGE G. MEADE
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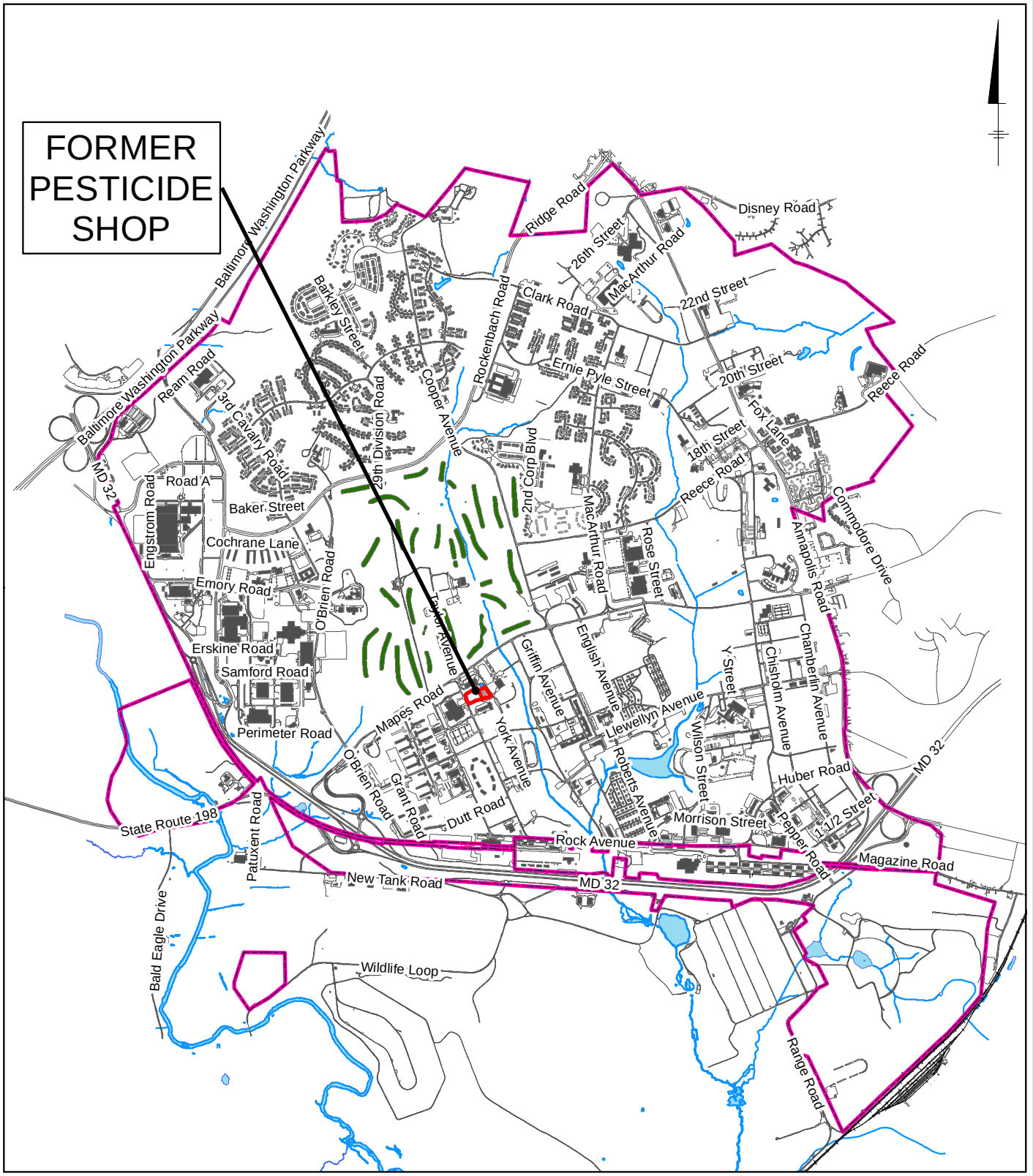


FGGM13 FORMER PESTICIDE SHOP, BUILDING 6621
FORT GEORGE G. MEADE, MARYLAND

FGGM13 FORMER PESTICIDE SHOP, BUILDING 6621
SITE LOCATION MAP

ARCADIS

FIGURE 2

CITY: DIV: ENV-IMDV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Maryland FIPS 1900 Feet
Z:\GISPROJECTS_ENV\Fort_Meade\ArcMap\Pesticide_Shop\2014\2014 Annual Monitoring Report\Fig2_Pesticide_Shop_Loc_20141211.mxd PLOTTED: 12/11/2014 6:01:35 PM BY: sbell

LEGEND:

- SITE BOUNDARY
- FORMER PESTICIDE SHOP AREAS
- FORMER BUILDING 6621

NOTES:

11/2011 IMAGERY ACCESSED THROUGH BING MAPS AERIAL VIA ARCGIS ONLINE LAYER PACKAGES BY ESRI (12/1/2010) (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS ACCESSED ON 3/6/2013 THROUGH ARCGIS 10.

FGGM13 FORMER PESTICIDE SHOP, BUILDING 6621
FORT GEORGE G. MEADE, MARYLAND

FGGM13 FORMER PESTICIDE SHOP, BUILDING 6621 SITE MAP

ARCADIS

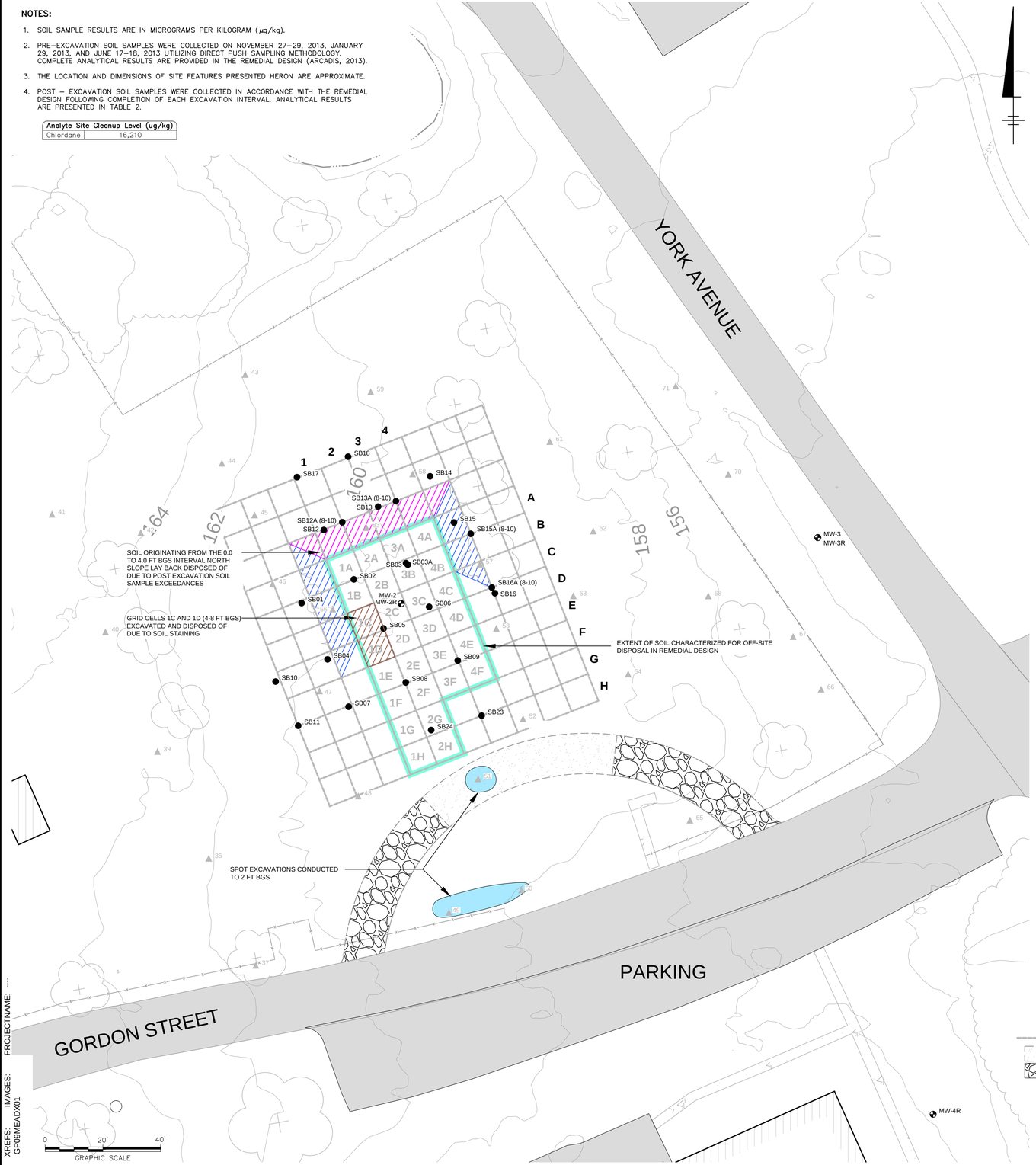
FIGURE 3

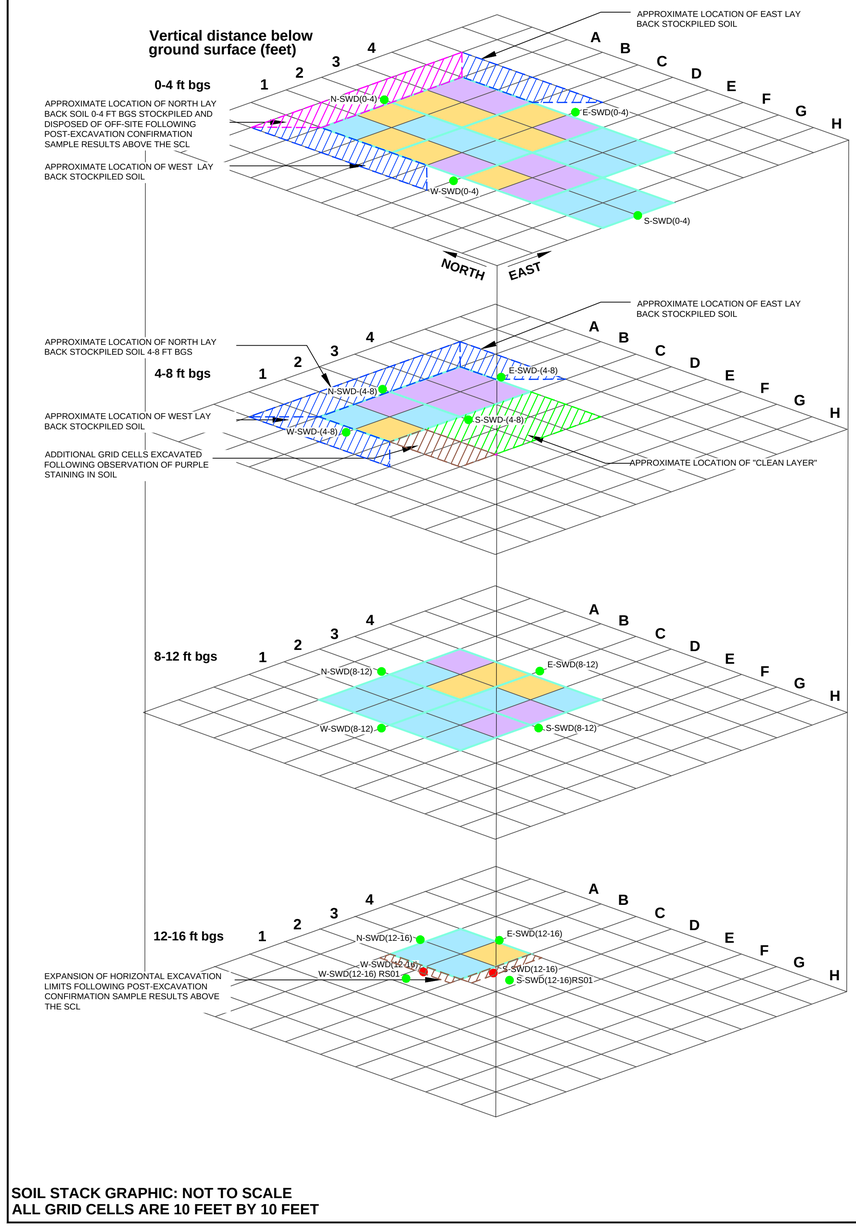
CITY: MPLS DIV/GROUP: IM DB: MG LD: AD
FORT MEADE
Path: G:\GIS\Projects\Fort_Meade\ArcMap\Pesticide_Shop\20131621_Location_Map_20130308.mxd

NOTES:

1. SOIL SAMPLE RESULTS ARE IN MICROGRAMS PER KILOGRAM (µg/kg).
2. PRE-EXCAVATION SOIL SAMPLES WERE COLLECTED ON NOVEMBER 27-29, 2013, JANUARY 29, 2013, AND JUNE 17-18, 2013 UTILIZING DIRECT PUSH SAMPLING METHODOLOGY. COMPLETE ANALYTICAL RESULTS ARE PROVIDED IN THE REMEDIAL DESIGN (ARCADIS, 2013).
3. THE LOCATION AND DIMENSIONS OF SITE FEATURES PRESENTED HERON ARE APPROXIMATE.
4. POST – EXCAVATION SOIL SAMPLES WERE COLLECTED IN ACCORDANCE WITH THE REMEDIAL DESIGN FOLLOWING COMPLETION OF EACH EXCAVATION INTERVAL. ANALYTICAL RESULTS ARE PRESENTED IN TABLE 2.

Analyte Site Cleanup Level (ug/kg)	
Chlordane	16,210





SOIL STACK GRAPHIC: NOT TO SCALE
ALL GRID CELLS ARE 10 FEET BY 10 FEET

LEGEND

- PRE-EXCAVATION SOIL SAMPLE LOCATION
- HISTORICAL SAMPLE LOCATION, MARCH 2006
- MONITORING WELL
- SAMPLE GRID
- DIRT ACCESS ROAD
- STABILIZED CONSTRUCTION ENTRANCE
- NON-HAZARDOUS, TCLP CHLORDANE <0.03 mg/L (KING AND QUEEN SANITARY LANDFILL)
- HAZARDOUS, TOTAL CHLORDANE >50 mg/kg (BENNET)
- HAZARDOUS, TOTAL CHLORDANE <50 mg/kg (STABLEX)
- POST- EXCAVATION CONFIRMATION SOIL SAMPLE LOCATION, TOTAL CHLORDANE <SCL OF 16,210 µg/kg
- POST- EXCAVATION CONFIRMATION SOIL SAMPLE LOCATION, TOTAL CHLORDANE >SCL OF 16,210 µg/kg
- TEMPORARY STOCKPILED SOIL ABOVE SCL, SOIL DISPOSED OF OFF-SITE
- TEMPORARY STOCKPILED SOIL BELOW THE SCL, SOIL USED AS BACKFILL
- "CLEAN" SOIL LAYER AS DETERMINED DURING PRE-EXCAVATION WASTE CHARACTERIZATION
- ADDITIONAL SOIL DISPOSED OF OFF-SITE
- mg/kg MILLIGRAM/KILOGRAM
- TCLP TOXICITY CHARACTERISTIC LEACHING PROCEDURE

FGGM13 FORMER PESTICIDE SHOP, BUILDING 6621
FORT MEADE, MARYLAND
REMEDIAL ACTION REPORT

SUMMARY OF EXCAVATION EXTENT

ARCADIS

FIGURE
4

CITY:(Req'd) DIV/GROUP:(Req'd) DB:(Req'd) LD:(Opt) PIC:(Opt) PM:(Req'd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\CRANBURYACT\GP09MEADIPEST\KK001\GP09MEADG05.dwg LAYOUT: 4 SAVED: 6/25/2014 2:01 PM ACADVER: 18.1S (LMS TECH)
XREFS: IMAGES: PROJECTNAME: ----
GP09MEADX01
PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 6/25/2014 3:14 PM BY: MEYER, JULIE
(LMS TECH)

CITY: DIV: ENV-IMDV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Maryland FIPS 1900 Feet
Z:\GISPROJECTS_ENV\Fort_Meade\ArcMap\Pesticide_Shop\2014\GWE_Feb14_2011211.mxd PLOTTED: 12/11/2014 5:55:59 PM BY: sbell

LEGEND:

- WELL
- STREAM GAUGE
- ROAD
- RAILROAD
- DIRECTION OF GROUNDWATER FLOW
- DEMOLISHED STRUCTURES
- EXISTING STRUCTURES
- SURFACE WATER
- INSTALLATION BOUNDARY
- 130.89 GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL), FEBRUARY 2014

0 100 200 Feet

GRAPHIC SCALE

NOTES:

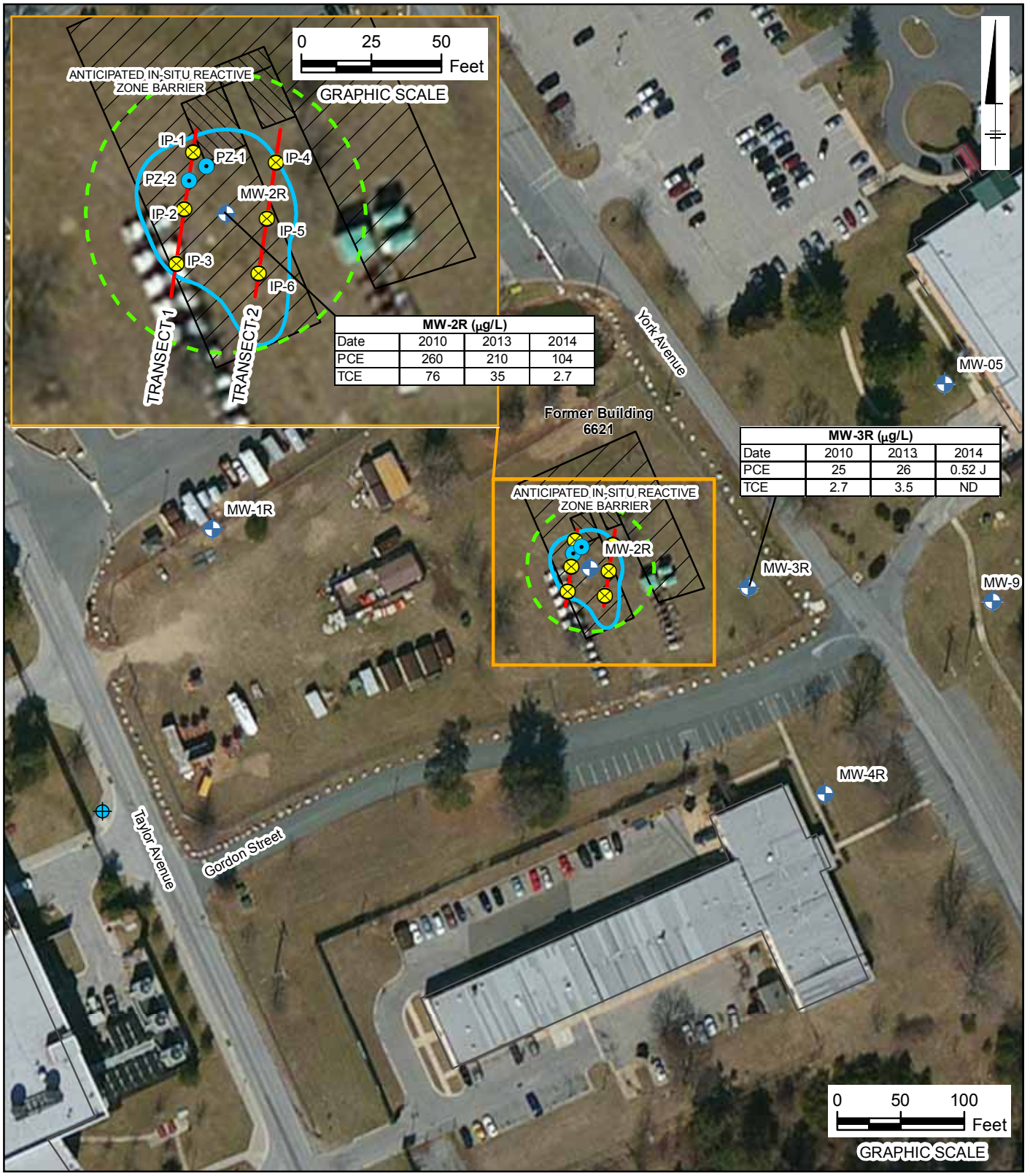
11/2011 IMAGERY ACCESSED THROUGH BING MAPS AERIAL VIA ARCGIS ONLINE LAYER PACKAGES BY ESRI (12/1/2010) (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS. ACCESSED ON 12/11/2014 THROUGH ARCGIS 10.

FGGM13 FORMER PESTICIDE SHOP, BUILDING 6621
FORT GEORGE G. MEADE, MARYLAND

FEBRUARY 2014 GROUNDWATER ELEVATIONS

ARCADIS

FIGURE
5



LEGEND:

- WELL
- INJECTION TRANSECTS
- APPROXIMATE EXTENT OF EXCAVATION
- INJECTION POINT
- TEMPORARY PIEZOMETER
- WATER SOURCE
- FORMER PESTICIDE SHOP BUILDINGS
- FORMER BUILDING 6621
- ANTICIPATED IN-SITU REACTIVE ZONE BARRIER

NOTES:
1. IP – INJECTION POINT
2. PZ – TEMPORARY PIEZOMETER
3. TCE - TRICHLOROETHENE
4. PCE - TETRACHLOROETHENE
5. µG/L - MICROGRAMS PER LITER
6. ND - ANALYTE WAS NOT DETECTED ABOVE REPORTING LIMITS
7. J - INDICATES AN ESTIMATED CONCENTRATION
8. 11/2011 IMAGERY ACCESSED THROUGH BING MAPS AERIAL VIA ARCGIS ONLINE LAYER PACKAGES BY ESRI (12/1/2010) (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS. ACCESSED ON 12/11/2014 THROUGH ARCGIS 10.

FGGM-13 FORMER PESTICIDE SHOP, BUILDING 6621
FORT GEORGE G. MEADE, MARYLAND

ENHANCED REDUCTIVE DECHLORINATION LAYOUT

ARCADIS

FIGURE 6

CITY: DIV: ENV-IMDV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Maryland FIPS 1900 Feet
Z:\GISPROJECTS_ENV\Fort_MeadeArcMap\Pesticide_Shop\2014\ERD_Layout_20141211.mxd PLOTTED: 12/11/2014 6:25:14 PM BY: sbell

SIGNS (6 TOTAL) SHALL APPEAR AS SHOWN BELOW:

LEGEND:

SIGN LOCATIONS

EXTENT OF LAND USE CONTROLS

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

FGGM13 FORMER PESTICIDE SHOP, BUILDING 6621
FORT GEORGE G. MEADE, MARYLAND

EXTENT OF LAND USE CONTROLS

ARCADIS

FIGURE 7

CITY: MPLS DIV/GROUP: IM DB: MG LD: HA
FORT MEADE
Path: Z:\GISPROJECTS_ENV\Fort_Meade\ArcMap\Pesticide_Shop\2014\LandUse_Controls_20140813.mxd

Appendix A

Construction Photo Log

Photo 1: Pre-existing conditions
Date: October, 2013
Location Taken: Southwest corner of the Site
Direction Facing: Northeast

Photo 2: Pre-existing conditions and silt fence installation.
Date: December 4, 2013
Location Taken: Southwest corner of the Site
Direction Facing: Northeast

Photo 3: Silt fence installation
Date: December 4, 2013
Location Taken: South portion of the Site along Gordon Street
Direction Facing: West

Photo 4: Site access road and temporary truck gate. Road closure signs at York Avenue and Gordon Street
Date: December 13, 2013
Location Taken: Site entrance on Gordon Street
Direction Facing: Southeast

Photo 5: Delineation of excavation grid at the ground surface
Date: December 4, 2013
Location Taken: South at Gordon Street Site entrance
Direction Facing: Northeast

Photo 6: Reestablishment of survey controls and delineation of the excavation grid at 4-8 foot (ft) depth interval
Date: December 17, 2013
Location Taken: West excavation boundary
Direction Facing: East

Photo 7: Survey controls including string lines, survey stakes, and metal sheeting. Achievement of final vertical and horizontal excavation limits.

Date: January 30 , 2014

Location Taken: Southeast corner of the Site

Direction Facing: Northwest

Photo 8: Delineation of waste streams using spray paint and metal sheeting partitions.

Date: December 17, 2013

Location Taken: West

Direction Facing: East

Photo 9: Surface excavation following backfill (Soil sample locations 49 and 50, refer to **Figure 4**).

Date: February 12 , 2014

Location Taken: Southern portion of the Site along Gordon Street

Direction Facing: East

Photo 10: Surface excavation following backfill (Soil sample location 51, refer to **Figure 4**).

Date: February 12 , 2014

Location Taken: Southern portion of the Site along Gordon Street.

Direction Facing: East

Photo 11: Purple staining in (cell 1C [4-8 ft bgs]).
Date: January 9 , 2014
Location Taken: Central portion of the western excavation boundary
Direction Facing: East

Photo 12: Purple staining identified in grid cell 1B (0-4 feet below ground surface [bgs]).
Date: December 13, 2013
Location Taken: ---
Direction Facing: ---

Photo 13: Geotextile liner and plywood sheeting to prevent cross contamination of impacted soil at the ground surface.

Date: December 13, 2013

Location Taken: North central portion of the Site

Direction Facing: South

Photo 14: Polyvinyl sheeting and plywood sections to prevent cross contamination of impacted soil at the ground surface.

Date:

Location Taken: Northeast corner of the Site

Direction Facing: West

Photo 15: Material load out.
Date: January 21, 2014
Location Taken: Southeast corner of the Site
Direction Facing: Southwest

Photo 16: Excavation and stockpiling of concrete foundation.
Date: December 16, 2013
Location Taken: Northeast corner of the excavation
Direction Facing: East

Photo 17: Location of soil stockpiles.
Date: January 21, 2014
Location Taken: Southeast corner of the Site
Direction Facing: Northwest

Photo 18: Stockpiling within excavation for direct load out of material.
Date: January 15, 2014
Location Taken: Southeast corner of the Site
Direction Facing: West

Photo 19: Backfill operations.
Date: February 10, 2014
Location Taken: Southeast corner of the excavation
Direction Facing: Southwest

Photo 20: Backfill operations.
Date: February 10, 2014
Location Taken: Southeast corner of the Site
Direction Facing: Northwest

Photo 21: Installation of top soil layer and erosion matting.
Date: June 11, 2014
Location Taken: Southwest corner of the Site
Direction Facing: Northeast

Photo 22: Establishment of the grass cover.
Date: July 7, 2014
Location Taken: Southeast at gate entry to Site
Direction Facing: North

Photo 23: Dewatering of excavation
Date: January 28, 2014
Location Taken: Southwest corner of the Site
Direction Facing: Northeast

Photo 24: Pre-fabricated water treatment system.
Date: January 21, 2014
Location Taken: Off-Site
Direction Facing: NA

Photo 25: Sanitary sewer receiving treated groundwater.
Date: July 7, 2014
Location Taken: Southwest intersection of Gordon Street and York Avenue
Direction Facing: Northwest

Photo 26: Vacuum excavation at MW-9.
Date: February 24, 2014
Location Taken: South east corner of Gordon Street and York Avenue
Direction Facing: West toward York Avenue

Photo 27: Installation of MW-9.
Date: February 24, 2014
Location Taken: South east corner of Gordon Street and York Avenue
Direction Facing: West toward York Avenue

Photo 28: Injection set up.
Date: March 14, 2014
Location Taken: Northwest corner of the Site
Direction Facing: Southeast

Photo 29: Direct push injection points and temporary piezometers.
Date: March 14, 2014
Location Taken: South central portion of the Site
Direction Facing: North

Photo 30: Land use control sign (1 of 6)
Date: October 2, 2014
Location Taken: Site access gate along Gordon Street
Direction Facing: North

Photo 31: Land use control sign (2 of 6)
Date: October 2,2014
Location Taken: Southeast corner of the Site (Gordon Street and York Avenue)
Direction Facing: North

Photo 32: Land use control sign (3 of 6)
Date: October 2,2014
Location Taken: Eastern portion of the Site fence
Direction Facing: West

Photo 33: Land use control sign (4 of 6)
Date: October 2,2014
Location Taken: Northern portion of the Site fence
Direction Facing: South

Photo 34: Land use control sign (5 of 6)
Date: October 2,2014
Location Taken: Northwest corner of the Site
Direction Facing: East

Photo 35: Land use control sign (6 of 6)
Date: October 2,2014
Location Taken: Southwest corner of the Site
Direction Facing: East

Appendix B

MDE's Federal Facility Division Approval of Erosion and Sediment Control Permit Equivalent Package

Appendix C

Waste Disposal Manifests
(Provided on CD)

Appendix D

Waste Disposal Documentation

Appendix E

Analytical Results
(Provided on CD)

Appendix F

Material Specifications

Appendix G

USEPA and MDE Approval of Backfill Material

Appendix H

Agricultural Results (Topsoil)

Appendix I

Dewatering System

Appendix J

Air Monitoring Data
(Provided on CD)

Appendix K

Field Forms

Appendix L

Injection Consent Letter from MDE

Appendix M

Response to Comments

Response to Comments Table

Draft Remedial Action Report, Pesticide Shop, Fort George G. Meade, MD

September 2014

Response Code: A = Agree with comment D = Disagree with comment C = Comment requires clarification N = Comment noted, no action required or taken

Comment Number	Commenter	Date of Comment	Page(s)	Section	Line(s)	Comment	Response Code	Response
1	EPA RPM	11/6/14				The document should be titled Remedial Action Completion Report.	A	Agreed, the report title was revised to "Remedial Action Completion Report."
2	EPA RPM	11/6/14				The document should be reformatted to conform to the joint EPA and DOD guidance: http://www.denix.osd.mil/references/upload/RACR_Guidance.pdf. Additional information may need to be added in order to be consistent with the format suggested in the guidance.	A	Agreed, the report format was updated per the referenced guidance.
3	EPA RPM	11/6/14				Report Approval and Agency Acceptance. EPA signature is done at the Office Director level. The signature page should be revised to: Lori Reynolds Office Director (Acting) Office of Federal Facility Remediation and Site Assessment U.S. Environmental Protection Agency, Region III	A	Agreed, the signature block (Section 8) was revised as indicated.
4	MDE	11/13/14		General		According to U.S. Environmental Protection Agency (EPA) guidance (OSWER Directive 9320.2-22, "Close Out Procedures for National Priorities List Sites," May 2011), Remedial Action Completion for a groundwater remedy that involves in situ treatment should be considered when it is determined that the remedy is "Operational and Functional" (O&F) (Page 2-3, Exhibit 2-1). The subject report does not include any data to indicate that the remedy for groundwater is operating as intended. Please consider whether it would be appropriate to include several rounds of post-injection monitoring data to determine whether the contaminant of concern (COC) concentrations in groundwater are declining as expected due to enhanced reductive dechlorination.	A	Three quarterly LTM events were conducted in 2014: June 2014, September 2014, and October 2014. LTM activities and analytical data were presented to regulators in individual monitoring reports submitted on a quarterly basis. The forthcoming 2014 Annual Monitoring Report presents the most recent round of LTM data collected in October 2014 during the third quarterly monitoring event, presents data trends since remedy implementation, and discusses future actions at the Site. A brief summary of performance monitoring data trends was added to Section 5.4 to acknowledge that based on existing LTM data the remedy is operating as intended and reference to the quarterly reports was added to direct the reader to a more detailed discussion of 2014 data trends. For your reference a brief summary of data trends is provided below: • Following the March 2014 injection event, PCE concentrations decreased at MW-2R from 104 µg/L in March 2014 (baseline) to 27 µg/L in June 2014. A corresponding increase of degradation product cis-1,2- DCE was observed throughout 2014 with a maximum concentration of 28 µg/L occurring in October 2014. TCE remained stable at concentrations below the SCL. • Concentrations of dissolved organic carbon (DOC) at MW-2R increased immediately following the March 2014 injection (Baseline = 5 µg/L; Post Injection = 43 µg/L); however, concentrations decreased to levels slightly above baseline in the second, third, and fourth quarters of 2014 (October 2014 = 5.3 µg/L). • Methane concentrations have increased steadily at MW-2R following the March 2014 injection event with a maximum concentration occurring in the Fourth Quarter of 2014 (850 µg/L). No concentrations of ethane or ethene were detected at MW-2R during 2014. It is noted in the Fourth Quarter 2014 Groundwater Monitoring Results letter, that methane concentrations within MW-2R increased concurrent to the consumption of DOC which is indicative of a viable microbial community able to support enhanced reductive dechlorination. Furthermore, the concentrations of PCE exhibited a strong decline following injection and overall the concentration of PCE within MW-2R decreased when compared to baseline conditions, while the degradation byproduct cis-1,2-DCE increased. Therefore, CVOC data trends and performance monitoring results collected during 2014 indicate that the March 2014 injection event was successful in establishing an in-situ reactive zone in which reductive dechlorination of PCE and TCE is favorable in the vicinity of the Former Pesticide Shop (i.e. MW-2R). The historical maximum concentration of PCE was detected in June 2010 at MW-2R (260 µg/L). Concentrations of PCE at MW-2R have decreased since 2010 with the lowest concentration occurring immediately following the March 2014 injection event (June 2014 = 27 µg/L). Concentrations of PCE within the downgradient monitoring wells (e.g., MW-3R, MW-4R, and MW-9) have generally declined since the first long term monitoring event and are expected to continue to decline.
5	MDE	11/13/14		General		Assuming that the groundwater remedy is considered to be O&F, the report should be reorganized to follow the EPA guidance referenced in comment #1, and re-issued as a Remedial Action Completion Report.	A	The report title was changed to Remedial Action Completion Report; however, the report was reorganized per EPA comment #2 and conforms to the joint EPA and DOD guidance: http://www.denix.osd.mil/references/upload/RACR_Guidance.pdf.
6	MDE	11/13/14		General		To what is the drop in COC concentrations in MW-3R between 2012 and 2014 attributed?	N	In general, the decline in PCE concentrations observed at MW-3R and MW-2R between historical data (2010 - 2013) and February/March 2014 results is likely attributable to natural attenuation. However, baseline groundwater sampling was conducted following completion of the soil excavation at the former source area from December 2013 to February 2014. Thus, in addition to natural attenuation, localized transient groundwater flow posed by construction activities and seasonal fluctuations may have also attributed to the decline in PCE concentrations.