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RADFORD ARMY AMMUNITION PLANT  
RADFORD, VIRGINIA

Performance Based Acquisition  
Solid Waste Management Unit 40 (RAAP-009)  
Landfill Nitro Area  
Annual Long Term Monitoring Report: LTM Year 3

DRAFT FINAL  
As FINAL  
July 2014

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**LIST OF ABBREVIATIONS AND ACRONYMS**

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ANOVA	Analysis of Variance
CMOs	Corrective Measures Objectives
COC	Constituent of Concern
COPC	Constituent of Potential Concern
CSL	Carcinogenic Screening Level
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
ECs	Engineering Controls
ICs	Institutional Controls
IM	Interim Measures
IMCR	Interim Measures Completion Report
IMWP	Interim Measures Work Plan
IRP	Installation Restoration Program
KM	Kaplan-Meyer
KEMRON	KEMRON Environmental Services, Inc.
LOD	Limit of Detection
LOQs	Limits of Quantitation
LTM	Long Term Monitoring
MMA	Main Manufacturing Area
NRU	New River Unit
NTP	Notice to Proceed
OCDD	Octachlorodibenzodioxin
PAHs	Polycyclic Aromatic Hydrocarbons
PBA TO	Performance Based Acquisition Firm Fixed Price Task Order
QAPP	Quality Assurance Project Plan
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFAAP	Radford Army Ammunition Plant
RL	Reporting Limit
ROS	Robust Regression on Order Statistics
RSL	Regional Screening Level
SOP	Standard Operating Procedure
SSL	Soil Screening Level
SWMU	Solid Waste Management Unit
TEF	Toxic Equivalence Factor
T-RBC	Tapwater Risk Based Concentration
TW	Tarone-Ware
URS	URS Corporation
USACE	United States Army Corp of Engineers
USEPA	United State Environmental Protection Agency
UTL	Upper Tolerance Limit
UXB-KEMRON	UXB-KEMRON Remediation Services, LLC
VDEQ	Virginia Department of Environmental Quality
2,3,7,8-TCDD	2,3,7,8-Tetrachlorodibenzo- <i>p</i> -dioxin

## **1.0 INTRODUCTION**

UXB-KEMRON Remediation Services, LLC (UXB-KEMRON) has been contracted by the U.S. Army Corps of Engineers (USACE) to perform Interim Measures (IM) at the Landfill Nitro Area, Solid Waste Management Area (SWMU) 40, at Radford Army Ammunition Plant (RFAAP), Radford, Virginia. This SWMU also is identified as RAAP-009 for purposes of the Army Environmental Database – Restoration (AEDB-R).

The SWMU 40 LTM is being performed under a Performance Based Acquisition Firm Fixed Price Task Order (PBA TO) for environmental remediation services at RFAAP. The site is being addressed under the Installation Restoration Program (IRP). The Department of Defense (DoD) established the Defense Environmental Restoration Program (DERP) to address environmental contamination located on current and former military installations. Remedial action at this site also is authorized and conducted under the authority of the federal Resource Conservation and Recovery Act (RCRA). The contract was issued by the United States Army Corps of Engineers (USACE) – Baltimore located at 10 S. Howard Street, Box 1715, Room 7000 in Baltimore, Maryland. This TO # DA01 was issued under UXB-KEMRON's Worldwide Environmental Remediation Services contract number W912DY-10-D-0027, with an award date of 30 June 2010 and a Notice to Proceed (NTP) date of 15 July 2010.

The Interim Measures Completion Report (IMCR), which included details of mobilization, installation of one additional downgradient monitoring well, repairs to the landfill cap North Slope, and implementing institutional controls (ICs) was approved as Final by US Environmental Protection Agency (USEPA) and the Virginia Department of Environmental Quality (VDEQ) in correspondence dated July 10, 2012. All work was performed in accordance with the IM Work Plan (IMWP) as approved by the USEPA and the VDEQ. In addition to the repairs specified in the IMWP, limited additional maintenance was conducted adjacent to SWMU 40 to further enhance and assure the stability of the landfill north slope and control stormwater runoff. Following completion of the Interim Measures, Long Term Monitoring (LTM) was initiated in November 2011 and is on-going. This report provides a summary of the LTM work conducted through the March 2014 LTM event, LTM Year 3.

### **1.1 Background**

#### **1.1.1 Site Description**

RFAAP is a government owned; contractor operated manufacturing facility located in southwestern Virginia approximately eight (8) miles southwest of Blacksburg. BAE Systems is the current operator along with a variety of other tenants. RFAAP consists of two noncontiguous areas, the Main Manufacturing Area (MMA) and the New River Unit (NRU).

SWMU 40 is located within the south-central portion of the MMA at RFAAP (Figure 1). Figure 2 shows the site layout, which includes the approximate 2-acre landfill area that comprises SWMU 40.

SWMU 40 consists of an undeveloped open area covered with grass. A gravel covered and fenced area used for temporary storage of asbestos is located at the eastern edge of the site (Figure 2). A paved road, identified as Landfill South Road for purposes of this LTM Report, is located immediately south of the landfill area and undeveloped land borders the landfill area to the north (field) and west (wooded area).



### 1.1.2 Site History

The RCRA Facility Assessment (RFA) was conducted by the USEPA in 1987 and identified SWMU 40 as having the potential to release contaminants into the environment. SWMU 40 is included in the RFAAP RCRA Permit for Corrective Action (USEPA, 2000).

The Final RFI/CMS was approved by USEPA and VDEQ in April 2009. According to the Final RFI/CMS (URS, April 2009), SWMU 40 was used for the burial of materials, such as paper, office trash, concrete, and rubber tires in the 1970s and early 1980s. The unit was not permitted by the Commonwealth of Virginia as a solid waste landfill. Operations ceased and the unit was closed with a clay cap and grass cover. Subsequently, areas located northeast of the unit were used to stockpile soil derived from construction-related activities. In approximately 1991, a fenced enclosure was constructed in the northeastern corner of the SWMU 40 area for use as temporary asbestos accumulation area (Figure 2).

The results of the human health risk assessment included in the Final RFI/CMS (URS, 2009) indicated that calculated cancer risks and hazard indices are within the USEPA target risk range for each receptor with the exception of the cumulative risk for the hypothetical future lifetime resident due primarily to arsenic and PCBs in soil. A future construction worker also had potential risk based upon potential aluminum exposure via the inhalation pathway. The RFI/CMS documented that soil Constituents of Potential Concern (COPCs) are primarily limited to the landfill material itself with the exception of a surficial area of PCB contamination in soil located adjacent to the northern escarpment of the landfill.

Additionally, the Final RFI/CMS identified chloroform as a groundwater COPC. Extensive source characterization was conducted at SWMU 40 during the RFI, including the collection of 91 soil samples, many of which were collected from landfill material and soil below the landfill material at SWMU 40. Chloroform was not detected in these samples. The RFI/CMS notes that the lack of detections and absence of other volatile organic constituents in groundwater samples suggests a potential alternate source for chloroform in groundwater at SWMU 40. During conduct of the RFI, chloroform was detected in samples collected from wells 40MW3 (19 µg/L), 40MW5 DUP AVG (23 µg/L), and 40MW6 (24 µg/L) at concentrations above its unadjusted tapwater risk based concentration (T-RBC) (0.155 µg/L) but below the USEPA MCL of 80 µg/L for total trihalomethanes. The Final RFI/CMS notes that the landfill area is located downgradient of developed areas containing water lines that could be leaking, and which may be the source of chloroform in groundwater at SWMU 40. Therefore, based upon the site specific data, a SWMU 40 chloroform source is not identifiable. However, based upon the groundwater detections of chloroform, chloroform was retained as a COPC until the completion of the first four quarters of data collected during the LTM. The LTM Report for Year 1 removed chloroform as well as other analytes from the monitoring network parameters and was approved by USEPA and VDEQ May 30, 2013.

Perchlorate has been detected in numerous wells at RFAAP at low concentrations. The RFI/CMS noted that updated laboratory analytical detection limits that are lower than historic limits may be the reason for low level detections. The RFI/CMS also noted that groundwater samples located immediately adjacent to and downgradient of the landfill (40MW3, 40MW5, and 40MW6) were below the unadjusted T-RBC; therefore, perchlorate was not identified as a COPC in groundwater. However, the Army agreed to retain perchlorate as a groundwater monitoring analyte at this time, based on detections reported in the RFI/CMS.

The RAAP-009, SWMU 40 Final RFI/CMS was reviewed and approved by USEPA and VDEQ in correspondence dated June 30, 2009. The USEPA and VDEQ agreed to the use of Interim Measures as a means to accelerate closure of this site and begin long-term maintenance and monitoring. UXB-KEMRON prepared the Interim Measures Work Plan (IMWP) on behalf of the Army in conformance

with the specifications detailed for Alternative 2 in the approved Final RFI/CMS. The IMWP included the repair to the landfill cap in areas impacted by surface erosion, placement of cover to address the potential exposure to the surficial area of PCB contamination in soil located adjacent to the northern escarpment of the landfill, installation of one additional downgradient monitoring well, and initiation of Long Term Monitoring and Maintenance (LTM) activities associated with cap maintenance and monitoring and groundwater monitoring. The IMWP was approved by USEPA and VDEQ on August 26, 2011. The IMCR provided documentation of the completion of the IM and was approved by USEPA and VDEQ July 10, 2012. The LTM activities and resulting data for Year 3 are contained within this LTM Report in accordance with the approved August 2011 IMWP and as outlined in the approved LTM Reports for Year 1 and Year 2.

## 1.2 Corrective Measures Objectives

The Corrective Measures Objectives (CMOs) for SWMU 40 are:

- Maintain containment of the landfill material at the site and implement necessary controls to prevent future uncontrolled human exposure to this landfill material.
- Implement any necessary measures to stabilize and repair the landfill cover at the northern edge of the landfill area to prevent any further mass transport of soil material in this area.

## 1.3 Project Objectives

In accordance with the *SWMU 40 Final RFI/CMS*, April 2009, and the Final IMWP, August 2011, IMs were conducted to accelerate closure of this site and begin LTM. The IMs included:

1. **Engineering Controls (ECs) and Landfill Cap Repairs:** ECs included repairs to the landfill cap where evidence of erosion had been noted, primarily the north face of the unit. Repaired areas were stabilized and seeded to support a vegetative cover and minimize additional erosion.
2. **Monitoring Well Installation:** Installation of 40MW7 on the downgradient side of SWMU 40. A location was preselected approximately 135 feet west-northwest of the landfill area as indicated and more fully described in the approved RAAP-009 SWMU 40 Final RFI/CMS.
3. **Long Term Monitoring and Maintenance:** Conduct of LTM per the LTM Plan.

Section 2 of this report provides additional details of the IM implementation (specifically Long Term Monitoring and Maintenance) to achieve the project objectives.

## 2.0 Long Term Monitoring and Maintenance

### 2.1 Long Term Monitoring Plan

The groundwater monitoring network at SWMU 40 consists of one upgradient well, LFMW01, and three downgradient wells. The three downgradient wells include existing wells 40MW5, 40MW6, and the new well 40MW7. Installation of this new well was presented in the IMCR. The table below summarizes the long term monitoring program that is being implemented as part of the Corrective Measures at SWMU 40.

#### Long Term Groundwater Monitoring Program, SWMU 40, RAAP-009:

Monitoring Well Designation	Relative Position to SWMU 40	Monitoring Frequency	Analytical Parameters
LFMW01	Upgradient	Year 1: Quarterly Years 2-5: Every 9 months Years 6-30: Annual	Field water quality: pH, turbidity, specific conductance, temperature, dissolved oxygen, oxidation/reduction potential  TCL VOCS, SW846 Method 8260B; TCL SVOCs, SW846 Method 8270C SIM; TCL Pesticides, SW846 Method 8081A; TAL Metals, SW846 Method 6000/7000; Perchlorate, SW846 6850; Dioxins/furans, SW846 Method 8290 included in initial sampling event only
40MW05	Detection Well at edge of landfill boundary		
40MW06	Detection Well at edge of landfill boundary		
40MW07	Well downgradient of Landfill		

The first year of long term monitoring (LTM) included four quarterly monitoring events with the exception of dioxins and furans which were sampled and analyzed only in the first quarterly sampling event of the first year of LTM as specified in the approved IMWP and CMS. The LTM Report for year one was submitted with outlined reduction of analyte requirements to optimize the LTM Program. The reduction of COPC's for the LTM program was approved by USEPA and VDEQ May 30, 2013. Year 2 LTM activities and results were presented in a report dated October 2013 and approved by USEPA and VDEQ January 7, 2014. This LTM report summarizes the sampling and analysis of the remaining analytes in the year three monitoring program (event six). Analytical results are summarized in tabular form, and complete laboratory analyses are presented in electronic form (e.g., CD ROM).

The groundwater data were screened in accordance with the approved IMWP. Data screening was conducted in the Year 1 and Year 2 LTM reports consistent with the IMWP to eliminate any analytes that met screening criteria outlined below to further optimize the LTM Program. Retention of analytes in the LTM monitoring and reporting are evaluated in this Year 3 LTM report and will similarly be evaluated for each subsequent sampling and analysis event based upon the site specific dataset that will be included and evaluated for further optimization of the LTM Program.

A list of the specific analytes included in the groundwater LTM program and their associated limits of detection (LODs) and limits of quantitation (LOQs) were presented in the site-specific Quality Assurance Project Plan (QAPP), Appendix B, Master Work Plan Addendum #30 (KEMRON, 2011).

The following criteria established in the IMWP were applied to the data evaluation and optimization of the monitoring program after the first four quarters of data generation, the year two and three data generation, and will continue to be implemented throughout the LTM program for further optimization:

- 1) Analytes that did not exceed the laboratory LOD during three (3) consecutive monitoring events or exceed the LOQ during the first four (4) monitoring events will not require further sampling and analysis;
- 2) Analyte detections that did not exceed the established background concentration for 3 successive sampling events will not require further sampling and analysis;
- 3) Analyte detections that did not exceed half the relevant MCL or half the relevant Regional Screening Level (RSL) as presented in the approved IMWP for 3 successive sampling events and the results displayed a static or downward trend will not require further sampling and analysis.

The site specific data was evaluated using appropriate statistical methodologies, and data assessment was conducted in general conformance with the recommendations of USEPA guidance entitled *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance, March 2009* (EPA 530/R-09-007). A more detailed description on the data evaluation and remaining analytes is discussed in Sections 2.4 and 3.

## **2.2 Long Term Inspection and Maintenance Plan**

Additional long term maintenance was conducted at SWMU 40, RAAP-009; including inspection of the landfill cap to ensure that the landfill cap integrity is maintained. Inspections were conducted in conjunction with groundwater monitoring events and thus follow the same schedule specified in the table in Section 2.1, Long Term Groundwater Monitoring Program.

Inspections included visual evaluation and documentation of negative effects of the following:

1. Precipitation run-on and runoff;
2. Water and/or wind erosion;
3. Rodent and/or vector activity;
4. Deep root vegetation;
5. Vegetative stress and other cover condition;
6. Subsidence or cracks in cap;
7. Excavation or other manmade intrusive work conducted within the landfill footprint.

The previous landfill cap inspections are outlined in the relevant LTM reports (KEMRON 2012 and 2013). The sixth inspection was conducted during the LTM groundwater sampling event March 27, 2014. No major issues or deficiencies were noted during the most recent inspection. Prior to the March 2014 inspection, RFAAP communicated with USEPA and VDEQ regarding appropriate language to be included on signage planned for installation at RAAP-009, SWMU 40, consistent with Section 9.4 of the approved IMWP. Following agreement on the language for the sign, KEMRON prepared the appropriately sized and worded sign, and it was installed at SWMU 40 during the March 2014 LTM event. The sign installation completed the only outstanding element for the institutional controls (ICs) required at this SWMU. The completed inspection sheet and supporting photos, including photographs of the installed signage, are included in Appendix A.

## **2.3 Groundwater Sampling**

Groundwater samples were collected as part of the LTM. The groundwater monitoring network at SWMU 40 consists of one upgradient well, LFMW01, and three downgradient wells. The three downgradient wells include existing wells 40MW5 and 40MW6, as well as 40MW7. Monitoring wells locations are shown on Figure 2.

Sampling was conducted in conformance with approved standard operating procedure (SOP) 30.2 of the approved work plan and as described in the Section 5.2.10 of the MWP (URS, 2003). Groundwater sampling was conducted using low flow purge and sampling, consistent with past sampling events. All non-dedicated sampling equipment was decontaminated in accordance with SOP 80.1 of the approved work plan. Completed field documentation is included in Appendix B. Water level measurements were

collected and the potentiometric map from the sixth event is included in Appendix C. Based on the monitoring, ground water at SWMU 40 generally flows in a northwest direction which is consistent with historical ground water flow at the site. Please refer to Appendix C for potentiometric surface maps of SWMU 40.

## **2.4 Data Evaluation**

The site specific data was evaluated using appropriate statistical methodologies, and data assessment was conducted in general conformance with the recommendations of USEPA guidance entitled *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance, March 2009* (EPA 530/R-09-007) in accordance with the approved work plan. Appendix D contains supporting data validation with complete laboratory analytical reports, provided on CD-ROM. Appendix E contains analytical summarization tables.

The following sections provide a summary of the data evaluation and LTM Program optimization for each analyte group that remain in the LTM Program as approved from the Year 1 and subsequent LTM Plans.

### **2.4.1 SVOC PAH**

Applying the data screening established for the LTM program, the only analytes for SVOC PAHs that exceeded the LOD and/or LOQ are Benzo(k)fluoranthene, Chrysene, Benzo(a)anthracene, Benzo(a)pyrene, and Benzo(b)fluoranthene. Since initiation of LTM, sampling of monitor wells 40MW05, 40MW06 and 40MW07 has resulted in quantifiable results at or above the LOQ for only chrysene in 40MW06. The 6/12/12 sample had a reported concentration of 0.89 J  $\mu\text{g/L}$  in the normal sample and 0.0301  $\mu\text{g/L}$  was reported in the field duplicate sample. These samples, however, were taken on the same date and so do not qualify as concentrations above the LOQ on two consecutive dates. Benzo(a) anthracene, benzo(a)pyrene, benzo(b)fluoranthene and benzo(k)fluoranthene also had reportable (but J-flagged) concentrations in the normal sample taken on 6/12/12; however, these PAHs were below reportable concentrations for the field duplicate sample. The laboratory analytical results from subsequent sampling of PAHs on 9/25/12, 6/19/13, and the recent event on 3/27/14 did not show concentrations of any of the PAHs above the respective analyte LOD. In accordance with the approved IMWP, these remaining SVOC PAHs which had no detectable concentrations in groundwater samples for three consecutive monitoring events will no longer be part of the future monitoring requirements for SWMU 40 to further optimize the LTM Program. Table 1 summarizes the remaining five (5) SVOC PAH analytical results for all the completed groundwater events.

### **2.4.2 VOC**

Acetone and 2-Chloroethyl Vinyl Ether were rejected during data validation of each prior sampling event due to low response factors. The sampling events on 6/19/13 and 3/27/14 resulted in validated nondetect data for both analytes. These two analytes will remain on the requirement list during sampling event 7 to provide sufficient data to determine if it is appropriate to remove them from the analyte list for future LTM events to further optimize the LTM Program, per the IMWP requirements and as summarized in Section 2.1 of this report. Table 2 summarizes the remaining required VOC analytical results for all the completed groundwater events.

### **2.4.3 Metals**

Remaining analytes for metals will be further evaluated following subsequent monitoring events. Table 3 summarizes the remaining required metals analytical data for all the completed groundwater events.

#### **2.4.4 Perchlorate**

Perchlorate exceeded the limits for screening by the LOD, LOQ, or one-half MCL as stated within the IMWP. Table 4 summarizes the Perchlorate analytical results for all the completed groundwater events.

### 3.0 CONCLUSIONS

The following Table 5 represents the remaining analytes for Year 3 long term monitoring at RFAAP SWMU 40. All screening of the data was completed in accordance with the approved IMWP, Section 9.1 and was completed to further optimize the LTM Program.

<b>Table 5 Year 3 LTM Analytes</b>		
<b>Constituent</b>	<b>LTM Plan</b>	<b>Note</b>
<b>Volatile Organic Compounds</b>		
2-Chloroethyl Vinyl Ether	Continue Monitoring	Continue monitoring to confirm validated Non detect data.
Acetone	Continue Monitoring	Continue monitoring to confirm validated Non detect data.
<b>Metals</b>		
Aluminum	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.
Arsenic	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.
Barium	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.
Calcium	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.
Cobalt	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.
Iron, Ferrous	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.
Lead	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.
Magnesium	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.
Manganese	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.
Potassium	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.
Selenium	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.
Sodium	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.
Vanadium	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.
<b>Other</b>		
Perchlorate	Continue Monitoring	Exceeded LOD, LOQ, or ½ the MCL in at least one prior sampling event.

The analyte list above (Table 5) will be implemented for the sampling and analysis in event seven (7), currently scheduled to occur in December 2014.

#### 3.1 Groundwater Statistics

The IWMP for SWMU 40 indicated that the initial annual LTM report would include calculation of a background dataset, based upon the first four sampling events. The background well at SWMU 40 is LFMW01. The concentrations of contaminants in downgradient wells (40MW5, 40MW6 and 40MW7) that were not eliminated due to LOQ, LOD and MCL screening criteria are to be compared to the calculated background values and any analyte below background in all three of the downgradient wells will be eliminated from the analytical reporting list for future sampling events to further optimize the LTM Program.

Within the first five years of monitoring, a remedy effectiveness evaluation will be conducted for SWMU 40. The remedy effectiveness evaluation will include a presentation of the groundwater data collected throughout the LTM program to date. The analytical results from the remaining analytes will be statistically evaluated against the background dataset, and to determine if any trends are exhibited. Following the background comparison of remaining analytes it is anticipated that the LTM Program will be further optimized as to reduce COPCs for the LTM Program. It is currently anticipated that a remedy review will be conducted during Federal Fiscal Year (FFY) 2015; additional information regarding the review will be provided in correspondence between RFAAP and the regulatory personnel.

While a statistical evaluation of both background and downgradient groundwater data is envisioned, the Final IMWP does not specify the statistical approach that will be used to evaluate groundwater data against the background data set. In fact, it anticipates that data collected after the first four quarters will be reviewed, and if appropriate, the monitoring program will be amended. This approach was agreed upon with USEPA and VDEQ due to the absence of available groundwater data from a monitoring network at SWMU 40.

RCRA regulations at 40 CFR 257.23(g) indicate that one (or a combination) of the following statistical methods be used in evaluating groundwater monitoring data for hazardous constituents.

1. A parametric analysis of variance (ANOVA) followed by multiple comparison procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each downgradient well's mean and the background mean levels for each constituent.
2. An analysis of variance (ANOVA) based on ranks followed by multiple comparison procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each downgradient well's median and the background median levels for each constituent.
3. A tolerance interval or prediction interval procedure in which an interval for each constituent is established from the distribution of the background data and the level of each constituent in each downgradient well is compared to the upper tolerance or prediction limit.
4. A control chart approach that gives control limits for each constituent.

The requirement to compare the concentrations in downgradient wells with calculated background values implies that the measurements of the concentrations of constituents in the background well as well as those in the downgradient well support the calculation of meaningful statistics on which to base the comparison. In general, if the measurements of a particular constituent do not include too many non-detects, and if the detected amounts can be characterized by a statistical distribution, then a parametric statistical approach can be used. If these characteristics of the data are not met, then a non-parametric approach may be possible. While statistical analysis was initiated for the first four quarters of data, statistics are not presented in this report based on the current limited sample size. Using the reduced monitoring list presented in Table 8, LTM event 7 will be conducted and the data will be further evaluated at that time to further optimize the LTM Program. The next LTM report will present the dataset available at that time, and determine if initial statistical evaluation is appropriate. The dataset and potential statistically based decisions will be presented in the report for determination of future LTM needs, based upon the currently available data and in conjunction with technical discussion among the Army, KEMRON, USEPA Region 3 and VDEQ.

Installation of the signage at SWMU 40 has completed the requirements for the ICs established by the IMWP. An inspection of the landfill will be included in the next LTM event, consistent with past events. No deficiencies were noted during the March 2014 inspection that require action.



No additional LTM activities are necessary prior to the next LTM event, which is currently anticipated to occur in December 2014. It is currently anticipated that a remedy effectiveness evaluation will be conducted during FFY 2015.

## 4.0 REFERENCES

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## **FIGURES**

**APPENDIX A**  
**Inspection Sheets and Site Photographs**

**APPENDIX B**  
**Field Documentation**

**APPENDIX C**  
**Potentiometric Maps**

**APPENDIX D**  
**Laboratory Reports and Data Validation Reports**  
**(CD-ROM)**

**APPENDIX E**  
**Analytical Data Tables**



**APPENDIX F**  
**Schedule**