

**POST-CLOSURE PLAN  
AREA 8 IWTP SLUDGE LANDFILL CELLS 1 AND 2**

**Lake City Army Ammunition Plant  
Area 8 IWTP Waste Landfill 709503  
Independence, Missouri**

**Revised June 2008  
Aquaterra Project Number 2606.10**

**AQUATERRA  
ENVIRONMENTAL SOLUTIONS, INC.**

*Prepared for:*

**Lake City Army Ammunition Plant**

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## ABSTRACT

This Hazardous Waste Management Act/Resource Conservation and Recovery Act (RCRA) post-closure plan was developed for the Industrial Waste Treatment Plant (IWTP) Landfill within Area 8 at Lake City Army Ammunition Plant (LCAAP). Cells 1 and 2 of the industrial waste landfill were identified as having a RCRA listed hazardous waste, K046 from the wastewater treatment sludge generated from the manufacturing, formulation and loading of lead-based initiating compounds. Cells 1 and 2 were subsequently classified as a RCRA treatment, storage and disposal facility subject to RCRA hazardous waste regulations. Cell 4 did not accept K046 waste, however will be maintained in accordance with the post-closure plan outlined for Cells 1 and 2. This post-closure plan has been developed in accordance with Resource Conservation and Recovery Act (RCRA) post-closure requirements under 40 Code of Federal Regulations (CFR) 265 Subpart G and Missouri Department of Natural Resources (MDNR) Hazardous Waste Management Program's (HWP) requirements outlined in 10 Code of State Regulations (CSR) 25-7.265.

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## ACRONYMS

ATK	Alliant Techsystems
CFR	Code of Federal Regulations
CSR	Code of State Regulations
DA	Department of Army
IWTP	Industrial Wastewater Treatment Plant
HWP	Hazardous Waste Program
LCAAP	Lake City Army Ammunition Plant
MDNR	Missouri Department of Natural Resources
HWMA	Hazardous Waste Management Act
RCRA	Resource Conservation and Recovery Act

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1.0 POST-CLOSURE PLAN

1.1 Introduction

This post-closure plan for the Area 8 IWTP Sludge Landfill at LCAAP has been prepared in response to the same RCRA and HWP requirements as its associated closure plan, 40 CFR 265 Subpart G and 10 CSR 25-7.265. The landfill will complete final closure on the schedule proposed in the closure plan, at which time this post-closure plan will take effect.

The requirement for content and submittal of a RCRA post-closure plan is presented in 40 CFR 265.118. The plan must include:

- Description of planned monitoring activities and frequencies,
- Description of planned maintenance activities and frequencies, and
- Contact person during post-closure.

The purpose of implementing post-closure care requirements for landfills is to properly maintain and monitor landfills for a specified period of time after their closure. This will prevent or minimize health hazards and environmental pollution. This plan will guide the operation and maintenance activities for the Area 8 Landfill by establishing overall goals and specific criteria for long-term care of this RCRA unit.

1.2 Post-Closure Timeframe

Post-closure maintenance will continue for 30 years from the date of final closure of the facility. Cell 4 did not accept K046 waste, however will be maintained in accordance with the post-closure plan outlined for Cells 1 and 2.

1.3 Post-Closure Care Program

The post-closure care program will consist of the following components:

- Site inspection
- Final cover erosion and seeding repair
- Initial semiannual groundwater monitoring
- Surface water control structure maintenance
- Record keeping

### 1.3.1 Site Inspection

The site will be inspected on a semi-annual basis to document settlement, erosion, and vegetation establishment. The overall goal of the site inspection is to maintain the structural and vegetative stability of the protective cover soils in the cap. The inspection will be accomplished by walking the site and recording any problems and their locations. Corrective action will be initiated to correct problems as soon as possible. Inspections will be completed in the early spring and early fall as well as shortly after major weather events that may have impacted the cover integrity. An inspection report will be completed shortly after all inspections. At a minimum, the report will include a narrative of items of concern; schedule of corrective action; and an inspection checklist of any areas of concern. The inspection checklist, included in Appendix A, will include corrective items to be addressed.

### 1.3.2 Final Cover and Vegetation Repair

Settlement that occurs on side slopes of the closed area will generally not require regrading or placement of additional cover to maintain surface drainage. Side slopes are designed at no greater than a 4:1 (horizontal: vertical) slope. The crown of the landfill area slopes at a minimum of 5 percent to minimize the effect of settlement on storm water run-off. With these slope conditions, it is anticipated that minimal soil will be required during the post-closure care timeframe for maintenance of this site. Soil to be used for repairs of the landfill surface is available on-site or nearby.

Vegetative maintenance of the cap will consist of fertilizing and/or liming as needed. Mowing will be conducted periodically on an as needed basis.

### 1.3.3 Groundwater Monitoring

Semi-annual groundwater monitoring of the network wells will be completed for six semi-annual events following placement of the final cover system on Cells 1 and 2. The groundwater monitoring network consists of six groundwater monitoring wells: MW8-10, MW8-12, MW8-13, MW8-15, MW8-17 and MW8-19. Groundwater monitoring will be conducted in accordance with "Appendix A: Field Sampling Plan" dated May 21, 2004 prepared by ARCADIS G & M, Inc.

Semi-annual groundwater monitoring will consist of groundwater level measurements and collection of groundwater samples by sampling using a bailer. The groundwater level measurement and sampling procedures are described below, from an excerpt of the May 21st, 2004 Field Sampling Plan. It should be noted that sampling procedures listed below include groundwater sampling for volatile organic compounds (VOCs); however, groundwater sampling for VOCs is not required at this time.

### Groundwater Level Measurements

Water level measurements will be referenced to a surveyed elevation point located on the top of the well casing. This measurement point will be surveyed by a Professional Land Surveyor and referenced to feet above mean sea level. An electronic water level probe will be used to gauge the water level in the new wells, in addition to the existing monitoring wells and piezometers at the facility. Water levels will be recorded in the new monitoring wells, existing monitoring wells and piezometers at periodic intervals in accordance with SOP 5.1. Dependent on known or expected site conditions, the monitoring well may also be checked for the presence of non-aqueous phase liquid (NAPL) in accordance with SOP 5.2. In general, water level measurements at each OU will begin with the upgradient wells (Le., inferred least contaminated wells) and proceed to the downgradient wells (Le., inferred most contaminated wells). Water-level measurements will be collected within a single 24-hour period and will be measured at least two times to check the reproducibility of the measurement data. This measurement validation helps ensure accuracy with regard to the water level data collection. The procedure for obtaining water level measurements is as follows:

1. Describe the area surrounding the well, whether or not the lock was secure (if applicable), if the well could have been impacted by surface water runoff, ambient weather conditions and other factors that could affect the final data analysis. This documentation is recorded on a Water Level Measurement Log.
2. The electronic water probe will be decontaminated prior to initiating water level measurements and between all wells and piezometers. Decontamination procedures are described in SOP 6.1. The protective casing will be unlocked and the inner cap on the riser removed.
3. The probe will be checked to verify that it is operational, and then will be lowered down the monitoring well.
4. Fluid level measurements will be taken from a fixed reference point (the north side of the top of the PVC riser unless otherwise marked with a groove or indelible ink) using an electric tape graduated in 0.01-foot intervals.
5. The measurements will be repeated until two measurements are obtained that are within 0.01-feet.

6. The probe will be removed and decontaminated, the inner cap replaced and the protective casing locked.

#### Groundwater Sampling using a Bailer

The following protocol, which pertains to SOP 9.3, has been developed to obtain groundwater samples that are representative of formation conditions and is intended for use in sampling monitoring wells during the field activities when low-flow sampling procedures cannot be used. New monitoring wells will not be sampled for at least seven (7) days following well development. Monitoring wells will be purged prior to collecting groundwater samples to ensure that representative formation water is being sampled. The monitoring wells will be purged and sampled in the same order as that for water-level measurements (upgradient to downgradient, or least contaminated to most contaminated where known based upon prior sampling results). Prior to introduction into the well, all non-dedicated equipment and materials will be decontaminated in accordance with the procedures outlined in SOP 6.1 and Section 3.15.

1. Put on clean latex or vinyl surgical gloves or nitrile gloves.
2. Unlock the metal protective casing, remove the well cap and document the general condition of the well.
3. Place plastic sheet around well head to prevent contact of sampling equipment with the ground.
4. Determine static fluid-level elevation using electronic probe. Record on Water Sample Log.
5. The total well depth should not be measured until after the samples have been collected to prevent suspension of possible sediment at the bottom of the well.
6. Compute the volume of water in the well (0.162 gallons/foot for a 2-inch diameter well).
7. Purge three to five well volumes using dedicated PVC bailer. Record start time field notes. If three well volumes cannot be removed from the well, purge dry and allow to recover for 12 to 24 hours prior to collecting the sample.

8. Obtain field parameter measurements (temperature, specific conductance, pH, dissolved oxygen, oxidation-reduction potential [ORP], and turbidity) after each volume of water is purged and record on the Groundwater Sample Log. Purging will continue until the criteria listed below have been met (unless low well recovery precludes this):
  - o The field parameters stabilize to within +/- 10 percent of three consecutive meter readings taken at least 3 minutes apart.
  - o The measured turbidity is less than 50 NTUs, unless low recovery precludes this.
9. Collect VOC sample, if required, for laboratory analysis directly into the pre-prepared appropriate sample container using dedicated PVC bailer with bottom emptying device. Ensure that no air bubbles are present in the vial. Secure sample container lid and store sample containers in chilled cooler after filling out the sample label. Proceed with collection of additional samples (Le., collecting in the order of semivolatiles, explosives, metals, and indicator parameters). Sample fractions for metals analysis will be filtered by the laboratory using a 45-micron filter. Therefore, UNPRESERVED sample fractions for metals must be submitted to the laboratory. Secure sample container lids and store sample containers in chilled cooler.
10. Complete sampling documentation on the Groundwater Sample Log.
11. If after 12 to 24 hours inadequate water is present in the well to fill the required sample containers, available groundwater will be collected for individual analyses in the appropriate sample order. Specific fractions will be determined on a case-by-case basis by the Field Operations Manager.
12. Replace cap on well and protective casing lock well.

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The following is a list of inorganic parameters to be analyzed semi-annually along with respective analytical methods and laboratory detection limits.

<b>Analytical Method: SW6020</b>		
Parameter	CAS Number	Detection Limit (ug/L)
Aluminum	7429-90-5	30
Antimony	7440-36-0	5
Arsenic	7440-38-2	5
Barium	7440-39-3	5
Beryllium	7440-41-7	1
Cadmium	7440-43-9	1
Calcium	7440-70-2	50
Chromium	7440-47-3	5
Cobalt	7440-48-4	1
Copper	7440-50-8	5
Iron	7439-89-6	500
Lead	7439-92-1	3
Magnesium	7439-95-4	50
Manganese	7439-96-5	5
Nickel	7440-02-0	5
Potassium	7440-09-7	500
Selenium	7782-49-2	5
Silver	7440-22-4	2
Sodium	7440-23-5	50
Thallium	7440-28-0	2
Vanadium	7440-62-2	50
Zinc	7440-66-6	20

Upon completion of the six semi-annual events, the six groundwater monitoring wells will be considered for abandonment. Pending **MDNR** approval, abandonment will be completed for these wells in accordance with 10 CSR 23-4.080.

**1.3.4 Surface Water Structure Maintenance**

During all site inspections, surface water control structures will be inspected to ensure their proper functioning. Any problems noted during the inspection will be addressed as soon as reasonably possible. Inspection of surface water structures should check for obstructions,

erosion, settlement of rip-rap, and washouts. Maintenance on surface water structures may include:

- Clearing obstructions that impede flow or create washouts
- Reseeding vegetation
- Removing vegetation or cutting vegetation
- Removing sediment from culvert discharge areas
- Flushing out culverts with water
- Placing additional rip-rap

#### 1.3.5 Record Keeping

All inspection reports, work orders, invoices, test results, and other pertinent information generated during the post-closure care period will be maintained by LCAAP. In accordance with 40 CFR 264.120, Professional Engineer certification of post-closure activities will also be maintained. These records will be maintained on-site by LCAAP personnel.

#### 1.4 Post-Closure Contact

The point of contact for the LCAAP facility during the post-closure care period will be:

Department of the Army  
Environmental Coordinator  
Lake City Army Ammunition Plant  
Independence, Missouri 64051  
(816) 796-7153  
Fax: (816) 796-7143

**Appendix A**  
**Inspection Checklist**

# Area 8 IWTP Sludge Landfill Operation and Maintenance Inspection Checklist

LAKE CITY ARMY AMMUNITION PLANT  
INDEPENDENCE, MISSOURI 64051

SITE: AREA 8 IWTP SLUDGE LANDFILL  
DATE: \_\_\_\_\_  
INSPECTOR: \_\_\_\_\_

INSPECTION NO.:

**WEATHER CONDITIONS:**

Temp: \_\_\_\_\_  
Wind: \_\_\_\_\_  
Skys: \_\_\_\_\_

- REASON FOR INSPECTION:**
- Scheduled Semi-annual Inspection
  - Post-Major Weather Event Inspection\*
  - Re-Inspection of Deficient Items
  - Other \_\_\_\_\_

\*Please note rainfall amount in Other Designation

AREA OF INSPECTION	INSPECTED	DOES NOT APPLY	ACCEPTABLE	NOT ACCEPTABLE	NOTES AND COMMENTS	PROPOSED CORRECTIVE ACTION
<b>LANDFILL CAP</b>						
Inspect the soil cover and perimeter road side slopes for ponded water, erosion rills or gullies, woody plants or tree saplings, settlement holes or damage, animal burrow holes, and any intrusive human activity. Check for adequate vegetative cover ( consider if larger than 100 square feet; less on side slopes.) Check the overall vegetative success and look for indications of botanical disease or weather distress. Check for washouts of soil along edge of crown. Check for signs of slope instability, tension cracks, slides or sloughs.						
<b>KEY INSPECTION AREAS:</b>						
Soil cover damage:						
Erosion rills or gullies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Settlement holes or cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Animal burrows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Intrusive human activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<b>Vegetation:</b>						
Woody Plans or tree saplings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Lack of vegetative cover	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Disease or weather stress	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<b>PERIMETER ROAD, CULVERTS, AND DRAINAGE DITCHES</b>						
Inspect perimeter road for washouts, slides, excessive rutting, soft pumping, poor drainage areas, condition of road surface, frost-heave damage, blockage in access road culvert and water migrating off the landfill cap outside the established drainage ditches. Culverts should be checked for obstructions and washouts. Ditches should be cleaned of debris, excess sediment removed, and erosion rills repaired.						
<b>KEY INSPECTION AREAS:</b>						
<b>Perimeter road:</b>						
General Conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<b>Culverts:</b>						
Obstructions or washouts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<b>Drainage Ditches:</b>						
Debris, excessive sediment, erosion rills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

