Resource Conservation and Recovery Act (RCRA)

Class 2 Hazardous Waste Storage & Treatment Facility

Permit Modification Request for

Open Burning/Open Detonation and

Controlled Destruction Chamber Operations

Blue Grass Army Depot, Richmond, Kentucky

EPA ID KY8-213-820-105

Submitted To:

Kentucky Department for Environmental Protection
Division of Waste Management
Frankfort, Kentucky

JUNE 2021

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1.0 OVERVIEW

This document contains a Class 2 Permit Modification Request (PMR) associated with the Open Burn (OB), Open Detonation (OD), and Controlled Destruction Chamber (CDC) Waste Military Munitions (WMM) treatment units at Blue Grass Army Depot (BGAD) located at 431 Battlefield Memorial Highway, Richmond, Kentucky. BGAD is the Permittee under the Resource Conservation and Recovery Act (RCRA) Part B Permit (EPA ID #KY8-213-820-105, AI #2805) issued by the Kentucky Department for Environmental Protection (KDEP), Division of Waste Management.

This PMR is being submitted in accordance with 401 Kentucky Administrative Regulation (KAR) 39:060, Section 5 (incorporating Title 40 Code of Federal Regulations [CFR] 270.42). The following changes are requested:

1) Remove wind speed and direction restrictions applied to OB.
2) Authorize OD of ammunition that is .50 caliber or smaller when these ammunitions are recovered/found within BGAD boundaries during routine inspections and operations and deemed unsuitable for shipment.
3) Revise the boundaries of OD unit, semi-annual, and annual maintenance inspections.
4) Revise the OB unit semi-annual inspection boundary.
5) Include an OB Unit Groundwater Monitoring Plan.
6) Revise the OD Unit Groundwater Monitoring Plan.
7) Revise the groundwater monitoring report submittal timeline requirement from current “within 30 days of each sampling event” to “within 75 days of each sampling event”.
8) Authorize the use of the OB/OD units for treatment of non-WMM energetic waste on a case-by-case basis
9) Revise the requirement to inspect erosion control structures associated with the OD unit from “after any one inch or greater rainfall event” to “after any two inch or greater rainfall event”.
10) Remove the hard-coded compliance schedule date of “November 1, 2020”t to complete emissions testing of the CDC unit.
11) Remove the self-imposed prohibition to store WMM overnight at the CDC Unit.

These proposed changes are being submitted as Class 2 modifications requiring approval and where eligible as Class 1 modifications, BGAD has elected to follow the Class 2 procedures consistent with 40 CFR 270.42(b)(1) and 40 CFR 270.42(a)(3).

The changes are consistent with the regulatory provisions and do not alter the capability of the facility to protect human health and the environment.

2.0 PERMIT MODIFICATION REQUEST

2.1 Class of Permit Modification

The proposed changes are being submitted as a Class 2 permit modification based on the criteria in 40 CFR 270.42 Appendix I.

2.2 Description and Justification for Permit Modification

2.2.1 Wind Speed and Direction Restrictions Applied to Open Burning

The current **Hazardous Waste Facility Permit OB/OD Section P.III.X.A(2)(d), Meteorological Restrictions** prohibits initiating OB operations when surface average wind speeds are (or are forecasted to be) less than 3 miles per hour (mph) or greater than 20 mph (with gusts less than 30 mph); or when winds are blowing from 300 degrees clockwise to 65 degrees (where north is 365 degrees). These self-imposed restrictions are not necessitated by the air modeling/risk assessment prepared in support of the Hazardous Waste Facility Permit. In addition, the wind direction restriction was erroneously imposed.

The wind speed and direction restrictions were self-imposed by BGAD in response to Army Materiel Command (AMC) Regulation 755-8, Authorizing, Accomplishing, and Reporting Demilitarization of Class V Material, 12 April 1995; the purpose of which is to provide policy guidance and prescribe procedures for accomplishing demilitarization of energetic Class V materiel to include conventional munition, bulk propellants, bulk explosives, large rockets, and guided missiles. Section 3-8 addresses weather conditions and includes the following:

Operations shall be restricted to periods when surface average wind speed is equal to or greater than 3 miles per hour and equal to or less than 20 miles per hour, with gusts less than 30 miles per hour and from a direction which will not carry emission products over any publicly accessible areas within 1 mile of the demilitarization site.

Appendix B of AMC Regulation 755-8 provides Weather Data Statistics Forms for documenting weather conditions and Section B-3 of Appendix B provided a Weather Data Checklist of forecast data required prior to detonation/burn/static fire. Items (g) and (h) of the Weather Data Checklist included:

> g. Wind speed – between 3 and 20 miles per hour as measured onsite.
>
> h. Wind direction – demolition limitations caused by wind direction is an installation unique factor.

Excerpts from AMC Regulation 755-8 are included in **Attachment 1**.

An installation-unique wind direction restriction was self-imposed by BGAD for OD when winds are blowing “from 300 degrees clockwise to 65 degrees”. The purpose of the restriction is to mitigate visible emissions resulting from soil entrained in the OD detonation plume from blowing across the southern installation boundary (the nearest boundary to off-site residential areas). The same wind direction restriction was not intended to be applied to OB because the smoke plume generated by OB dissipates rapidly and does not result in soil entrainment or visible emissions being carried over the installation boundary. At an undetermined time, a misinterpretation of the purpose of the wind direction restriction resulted in the restriction being incorporated into BGAD SOPs for both OB and OD.

At the time of development of the Protocol to conduct air modeling and risk assessment in support of the Hazardous Waste Facility Permit Applications BGAD identified its intent to remove the self-imposed wind speed and direction restrictions for OB. The Protocol therefore excluded these restrictions and air

modeling and risk assessment performed accordingly. That is, the modeling/assessment for OB assumed no wind speed and no wind direction restrictions. The results of the modeling/assessment effort are documented in "*Blue Grass Army Depot, Air Modeling and Risk Assessment for the Open Burning Unit, Open Detonation/Buried Detonation Unit, and Controlled Destruction Chamber, Volume II of the Hazardous Waste Facility Permit, RCRA Hazardous Waste Treatment Permit Application for Conventional Munitions by Open Burning and Open/Buried Detonation, EPA ID# KY8-231-820-105, September 2016, Revised June 2017*" which is available in the BGAD Administrative Record. Excerpts from the report including the cover page, Table 3-1, and Executive Summary are included in **Attachment 1**. Table 3-1, page 1 of **Attachment 1**, shows the meteorological restrictions imposed on the modeling effort. The Executive Summary, shows the conclusion that no unacceptable risk was determined. These air modeling and risk assessment results serve to demonstrate that the environmental performance standards of 40 CFR 264 Subpart X are met. That is, to demonstrate that the OB, OD, and CDC hazardous waste units can be operated in a manner that does not pose unacceptable risk to human health and the environment.

During its review of the Hazardous Waste Facility permit application for OB/OD, KDEP noted the change from prior weather restrictions and for consistency with other permitted Department of Defense OB/OD facilities in the Region, reinstated the restriction in its issuance of the final permit.

This PMR requests the removal of the wind speed and direction restriction in accordance with 40 CFR 270.42, Appendix I A.8 as a change to remove permit conditions that are no longer applicable (i.e., because the standards upon which they are based are no longer applicable), a Class 1 modification incorporated into this Class 2 PMR request.

2.2.2 Open Detonation of Ammunition that is .50 Caliber or Smaller

The current permit **Section P.III.A.(3), Prohibited Wastes**, prohibits "Ammunition that is 0.50 caliber or smaller". While BGAD did include small arms ammunition as a waste stream for OD treatment in its permit application (Table C-1 Military Munitions Families), KDEP prohibited this specific class of munitions because alternative treatment technologies for small arms ammunition exist within the Demil Enterprise. BGAD has since identified to KDEP, the need for on-site treatment capability when such items are recovered/found within BGAD boundaries during routine inspections and operations and deemed not suitable for shipment. Routine inspections and operations may include such activities as scheduled inspections of the OD unit, confiscation by security officials, rounds recovered from within vehicles undergoing maintenance/repair, and random recovery from the ground (e.g., ammunition lost by hunter). This allowance will negate the need for on-going temporary authorization requests in the future. This allowance does not in any way negate other prohibitions.

This PMR request is in accordance with 40 CFR 270.42(d)(2)(ii)(A) as a common variation in waste type managed, a Class 2 modification.

2.2.3 Open Detonation Unit Permit Boundary and Inspection Boundaries

Figure E-2a of the current permit identifies the "Approximate Limits of the Open Detonation Permit Area" (i.e., the OD Unit permit boundary). This figure also identifies the daily, semi-annual, and annual inspection limits.

KDEP approved a revised Figure E2a as part of BGAD's response to Notice of Deficiency (NOD1) to Compliance Schedule Items (CSI) #7 and #8, dated May 26, 2020. The permit and inspection boundaries identified on the revised Figure E2a are based on the findings of visual site inspection and modeling, the details of which were included in the Final Management Plan for Open Detonation Ejecta, May 2020, submitted in accordance with the requirements of CSI 8. Specifically, the results of visual site inspection and modeling supported a finding that ejecta from ongoing operations remain within these boundaries. Ejecta observed outside of these boundaries was observed to be associated with historical operations. The combination of visual observation and modeling provide the justification for the revised boundaries.

This PMR requests that the current Figure E2a be replaced with the KDEP-approved Figure E2a included as **ATTACHMENT 2.**

In its NOD2, dated August 31, 2020, KDEP requested that the proposed changes to the Open Detonation Unit boundary be submitted as a Class 2 PMR. In its NOD2, KDEP additionally notes that shrinking the OD Unit boundary will leave an area surrounding the proposed boundary that is possible contaminated with UXO, shrapnel, and/or other contaminants (groundwater and soil) which would need to be addressed. KDEP requests that the PMR propose a path forward for investigations and/or corrective action and a schedule. The requested information is as follows:

That area outside the newly defined OD Unit boundary and the historical boundary has been deferred to the Defense Environmental Restoration Program (DERP). As a DERP site, oversight of environmental restoration activities for this area will migrate to the KDEP Corrective Action Branch. A schedule will be developed in coordination with the Corrective Action Branch.

2.2.4 Open Burning Unit Semi-Annual Inspection Boundary

Figure E-2b of the current permit identifies the daily and semi-annual inspection limits of the Open Burn Unit.

KDEP approved a revised Figure E2b as part of BGAD's response to Notice of Deficiency (NOD1) to Compliance Schedule Items (CSI) #7 and #8, dated May 26, 2020. The semi-annual inspection boundary identified on the revised Figure E2a is based on operator knowledge and results of the initial inspections that encompassed the boundaries identified in the original Figure E2b. Specifically, that operations at the OB unit impact only a very limited area surrounding each pan and that the original semi-annual inspection area was unnecessarily large.

This PMR requests that the current Figure E2b be replaced with the KDEP-approved Figure E2b included as **ATTACHMENT 3**.

2.2.5 Open Burning Unit Groundwater Monitoring Plan

In response to CSI 2, BGAD submitted a Groundwater Monitoring Plan for the OB Unit, dated October 2, 2019. BGAD subsequently addressed KDEP's August 31, 2020 NOD1 request to identify a suitable upgradient monitoring location for the OB and OD units by revising the Plan to incorporate seep SP-19-3 as the background location. In its NOD1, dated August 31, 2020, KDEP requested that the final OB Unit Groundwater Monitoring Plan be submitted as a Class 2 PMR.

This PMR requests that the OB Unit Groundwater Monitoring Plan included as **Attachment 4** replace the current Section E of the permit application. Upon final well installation, it is anticipated that a future modification will incorporate the OB unit groundwater monitoring program into P.III.F.(2) of the Hazardous Waste Facility Permit OB/OD Section.

2.2.6 Open Detonation Unit Groundwater Monitoring Plan

In response to CSI 3, BGAD submitted a revised Groundwater Monitoring Plan for the OD Unit, dated April 9, 2019. BGAD subsequently addressed KDEP's August 31, 2020 NOD1 request to identify a suitable upgradient monitoring location for the OB and OD units by revising the Plan to incorporate seep SP-19-3 as the background location. In its NOD1, dated August 31, 2020, KDEP requested that BGAD additionally propose a statistical analysis system based on utilizing a background monitoring point.

This PMR requests that the OD Unit Groundwater Monitoring Plan included as **Attachment 4** replace the current Section E of the permit application. This PMR request is in accordance with 40 CFR 270.42, Appendix I C.1.a, changes in the number, location, depth, or design of upgradient or downgradient wells of permitted ground-water monitoring system a Class 2 modification and 40 CFR 270.42 C.3, changes in statistical procedure for determining whether a statistically significant change in ground-water quality between upgradient and downgradient wells has occurred, with prior approval of the director, a Class 1 modification incorporated into this Class 2 PMR request.

2.2.7 Groundwater Monitoring Report

The current **Hazardous Waste Facility Permit OB/OD Section P.III.F.(2)(f), Recordkeeping and Reporting**, requires BGAD to submit a written report of the results of groundwater monitoring. The current permit requires that the report be submitted within 30 days of each sampling event. Typical turn-around-time for analytical testing is 30-45 days. Data tabulation, validation, and reporting typically requires an additional 30-45 days. This PMR requests a revision of the report submittal time from 30 to 75 days.

This PMR is requested in accordance with 40 CFR 270.42 Appendix I A.4b as a change in the frequency of or procedures for monitoring, reporting, sampling, or maintenance activities by the permittee, a Class 2 modification.

2.2.8 Energetic Wastes Other Than Waste Military Munitions

The current **Hazardous Waste Facility Permit OB/OD Section P.III.A.(1), Permitted Waste Streams, Descriptions, and Codes**, identifies the waste streams authorized for treatment by OB and OD. Waste streams are identified as "munitions" within specified "Munitions Families". Waste streams that are not "munitions" are not included.

In its June 17 2017 hazardous waste facility permit application for conventional munitions by OB/OD (which serves as the basis for the current permit), BGAD identifies the need to occasionally manage energetic wastes associated with BGAD munitions activities that are not munitions or WMM. Examples provided include (1) solid waste (e.g., gauze, q-tips, wipes, paper towels) determined to be contaminated with energetic materials to the extent that these pose a potential fire hazard when

disposed in the solid waste stream and (2) metallic debris or components that, due to size or concentration of energetic material cannot be process through the BGAD flashing furnace, including, but not limited to metallic debris or components containing residual energetic materials generated during planned decommissioning of the BGAD Washout Facility. KDEP found details lacking in the permit application related to these waste streams and excluded them in issuance of the permit.

BGAD has expanded the description of procedures in Section C-1 of the permit application (see **Attachment 5**) to support the request.

This PMR requests the allowance to treat non-munitions related energetic waste streams that are not otherwise prohibited in P.III.A(3) at the OB and OD units on a case-by-case basis upon minimum one week in advance notification to KDEP. This PMR request includes the specific request to treat by OB and OD, metallic debris or components containing residual energetic materials generated during planned decommissioning of the BGAD Washout Facility.

This PMR is requested in accordance with 40 CFR 270.42 (d)(2)(ii)(A) as a change necessary to enable BGAD to respond, in a timely manner, to common variations in the types and quantities of the waste managed under the facility permit, a Class 2 modification.

2.2.9 Inspection of Erosion Control Structures at the Open Detonation Unit

The current **Hazardous Waste Facility Permit OB/OD Section P.III.XB(3), Inspections**, requires BGAD to inspect erosion control structures prior to the start of each OD operational season and after any one inch or greater rainfall event. BGAD has implemented this inspection as required since the effective date of the permit in November 2018. Observations and experience gained since issuance of the permit indicate no damage or deterioration of erosional control structures after any rainfall event of any magnitude. Based on this experience and observation, BGAD seeks a reduction in the inspection schedule from after any “one inch or greater rainfall event” to “after any two inch or greater rainfall event”.

This PMR is requested in accordance with 40 CFR 270.42, Appendix I B.4 as a change in frequency or content of inspection schedules, a Class 2 modification.

2.2.10 Remove CDC Emissions Testing Compliance Date

The current permit **Hazardous Waste Facility Permit CDC Section D.III.B.(10), Compliance Schedule**, requires that emissions testing for the purpose of confirming and updating the Human Health Risk Assessment for the CDC Unit be conducted to coincide with the compliance testing requirements of the Title V Air Permit, but no later than November 1, 2020. Stack emissions testing will be conducted in accordance with the Title V Air Permit, upon receiving funding for the production workload capability of the CDC unit from the Demilitarization Headquarter offices, currently under consideration. Request the reference to the hard-coded date be removed.

This PMR is requested in accordance with 40 CFR 270.42, Appendix I A.1 as an administrative change, a Class 1 modification incorporated into this Class 2 PMR request.

2.2.11 Remove Prohibition to Store Waste Military Munitions Overnight at the Controlled Destruction Chamber

The current **Hazardous Waste Facility Permit CDC Section D.III.X.(3)(a) Waste Processing Limits**, prohibits overnight staging of waste military munitions (WMM) at Building 280 and requires any untreated waste military munitions remaining at the end of the operating day to be repacked and returned to a permitted storage area. This prohibition was incorporated into the permit because the following language was included in **Section D-8a(2)(c) (page D-9)** the CDC permit application, consistent with BGAD operating procedures at the time:

"If WMM/energetic waste is delivered to Building 280 but is not treated on that day, it is repacked, a Hazardous Waste label is applied to each container, and the WMM/energetic waste is placed into appropriate Hazardous Waste storage. WMM/energetic waste is not stored at Building 280 overnight."

BGAD has since revisited this management practice with respect to explosives safety and handling and seeks to revise the procedure. Allowing overnight staging of WMM at Building 280 would reduce additional handling increasing worker safety, facilitate work progress, and save resources by eliminating the need for re-packing and additional movement. All applicable explosives safety storage standards and applicable hazardous WMM storage standards would be met. Building 280 has the capacity for accumulation of hazardous WMM and overnight storage.

This PMR requests that the page change included as **Attachment 6** replace the current page D-9 of the Hazardous Waste Facility Permit CDC Section. This PMR is requested in accordance with 40 CFR 270.42, Appendix I A.1 as an administrative and informational change, a Class 1 modification incorporated into this Class 2 PMR request.

3 REQUESTED PERMIT CHANGES

This PMR requests the following deletions (shown in strikeout) and additions shown in red.

3.1 Wind Speed and Direction Restrictions Applied to Open Burning

Hazardous Waste Facility Permit OB/OD Section P.III.XA.(2)(d) Meteorological Restrictions

The Permittee shall not initiate OB operations when any of the following meteorological conditions exists, or is forecasted by the National Weather Service or WebPuff to occur during the period of operations:

- ~~Surface average wind speeds less than 3 miles per hour or greater than 20 mph (with gusts less than 30 mph)~~
- ~~Winds blowing from 300 degrees clockwise to 65 degrees, where north is 360 degrees~~
- Electrical storms, thunderstorms, or a probability of 50 percent or greater of electrical storms or thunderstorms
- Lightning within 20 miles of BGAD
- Precipitation or a probability of precipitation of 75 percent or greater
- Visibility less than 1 mile
- Cloud cover greater than 80 percent or cloud ceiling less than 2,000 feet.

In addition, the Permittee shall comply with Department of Defense (DoD) standards for humidity restrictions.

[40 CFR 264.601 as established in 401 KAR 39:090 Section 1, KRS 224.46-530(1)(g)]

3.2 Open Detonation of Ammunition that is .50 Caliber or Smaller

Hazardous Waste Facility Permit OB/OD Section P.III.A.(1) Permitted Waste Streams, Descriptions, and Codes

Only munitions that are members of the munitions families listed below and that are not prohibited in P.III.A.(3) shall be treated at the OD unit.

Munitions Family	Example Items
Pyrotechnics/Illumination/Tracer	Ammunition used for illumination, marking, spotting, signaling, simulating or tracing
High Explosive Components and Devices	Detonators, boosters, bursting charges not otherwise configured with an ammunition
High Explosive Cartridges	Artillery or gun ammunition with HE projectile and a propelling charge such as 90 mm, 81 mm mortar, 30 mm fuzed and unfuzed cartridges
High Explosive D	Ammunition containing Explosive D (also known as ammonium picrate or yellow D)

Bulk High Explosive	TNT, pentaerythritol tetranitrate (PETN), cyclotetramethylenetetranitramine (HMX), RDX, Comp A, Comp B, Comp C-4, plastic bonded explosives (PBXs), Black Powder, IMX-101
High Explosive Grenades	Hand or rifle grenades containing explosive fillers
High Explosive Depth Charges and Underwater munitions	High explosive marine depth charges and underwater mines
High Explosive Projectiles and Warheads	Projectiles, warheads, mortars or similar devices that do not have a cartridge case, propellant, or rocket motor associated
HE Rocket Warhead	Rocket warheads and fuzes
Demolition Material	Demolition materials such as TNT, C-4, cratering charges, shaped charges, detonating cord, flexible sheet explosives, miscellaneous explosives used as donor material, plastic caps, fuzes, detonation cord
Fuzes	Fuzes (all types)
Land Mines	High explosive filled land mines including anti-tank mines
Ammunition that is 0.50 Caliber or Smaller[1]	**5.56 cal, 9 mm, 0.50 cal small arms ammunition**

[1] When recovered/found within BGAD boundaries during routine inspections and operations and deemed not suitable for shipment.

Hazardous Waste Facility Permit OB/OD Section P.III.A.(3) Prohibited Wastes

The Permittee shall not treat, by either OB or OD, munitions or wastes that contain any of the items or substances listed below:

- Hazardous waste from offsite sources, except as allowed in P.III.A.(1)
- ~~Ammunition that is 0.50 caliber or smaller~~
- Municipal waste
- Dunnage
- Containerized gases
- Oil
- Pesticides
- Herbicides
- Ammonium perchlorates
- Dioxins or furans
- Titanium tetrachloride
- Polychlorinated biphenyls (PCBs)
- Flechettes
- Rounds containing submunitions
- White phosphorus
- Red phosphorous
- Colored smoke
- Hexachloroethane (HC) smoke
- Napalm

- Riot control agents
- Biological agents
- Choking agents
- Nerve agents

3.3 Open Detonation Unit Permit Boundary and Inspection Boundaries

Hazardous Waste Facility Permit OB/OD Section Appendix B

Replace Figure E-2a.

3.4 Open Burning Unit Semi-Annual Inspection Boundary

Hazardous Waste Facility Permit OB/OD Section Appendix B

Replace Figure E-2b.

3.5 Open Burning Unit Groundwater Monitoring Plan

Hazardous Waste Facility Permit OB/OD Section P.III.F.(2) General Groundwater Monitoring Program

Once the point of compliance monitoring network for the OB Unit is installed, a future modification will incorporate it into the permit.

3.6 Open Detonation Unit Groundwater Monitoring Plan

Hazardous Waste Facility Permit OB/OD Section P.III.F.(2)(a) Well Location, Installation, and Construction

The Permittee shall install and maintain a groundwater monitoring system to comply with the requirements of 40 CFR 264 Subpart F as established in 401 KAR 39:090, Section 1, as applicable and as specified below:

- The Permittee shall maintain all groundwater monitoring wells at the facility as identified in Table F1 of this permit, at the locations specified on Figure E-2a in Appendix B of this permit.
- All groundwater monitoring wells shall be maintained in accordance with the plans and specifications presented in Part E of the OB/OD permit application and in accordance with 40 CFR 264.92 as established in 401 KAR 39:090, Section 1.
- A groundwater monitoring well shall not be removed from any monitoring program specified in this permit without a permit modification.
- If a groundwater monitoring well is damaged, the Permittee shall immediately notify the Manager in writing, to include a description of the well repair activities to be conducted. The Permittee shall not implement the well repair activities without approval from the Manager. Within 30 calendar days after the well is repaired, the Permittee shall submit a written notification to the Manager that the well repair activities were conducted in accordance with the approved procedures.

- If a groundwater monitoring well is deleted from the monitoring program(s) required by this permit, it shall be abandoned within 90 calendar days after deletion in accordance with 401 KAR 6:350, Section 11. Within 30 calendar days after the well is abandoned, the Permittee shall submit a written notification to the Manager that the well abandonment activities were conducted in accordance with the approved procedures.
- Groundwater monitoring wells MW4004C01, MW4004C02, MW4004C03, MW4004C04, MW4004C05, MW4004C06, ~~and~~ MW4004C10**, and SP-19-3b** shall define the points of compliance for the OD unit. A background monitoring point shall be established pursuant to Appendix A.
- The groundwater monitoring system shall consist of a sufficient number of ~~wells~~ **monitored locations**, installed**/identified** at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater passing the point of compliance and allow for the detection of contamination when hazardous waste or hazardous constituents have migrated from the waste management area to the upper-most aquifer.
- If any additional ~~wells~~ **monitored locations** are needed, a request for a permit modification shall be submitted to the Manager. Wells shall not be installed **or monitored locations added** until the permit modification is approved. The permit modification request shall specify the following:
    - The purpose for the change in the monitoring plan
    - The design, location, and depth, including screened interval
    - Well construction materials and techniques including casing depths and proposed total depth of well(s)
    - Well development method(s)
    - A schedule of implementation for construction
    - Provisions for determining the aquifer characteristics of the applicable aquifer at the location of the new well(s)

TABLE F1: MONITORING WELL DESIGNATIONS FOR THE OD UNIT

Well ID	Diameter (in)	TOC[1] (feet above MSL[2])	Total Depth (feet)	Screened Interval (feet)	Monitoring
MW4004C01	2	902.69	14.37	5.57-10.67	Downgradient
MW4004C02	2	905.35	13.74	4.78-9.86	Downgradient
MW4004C03	2	905.02	25.2	16.26-21.35	Downgradient
MW4004C04	2	900.14	15.95	3.00-13.00	Downgradient
MW4004C05	2	900.36	29.74	17.00-27.00	Downgradient
MW4004C06	2	900.57	17.77	5.00-15.20	Downgradient
MW4004C010	2	908.61	14.51	6.5-11.50	Downgradient
SP-19-3b	**NA**	**NA**	**NA**	**NA**	**Upgradient**

Hazardous Waste Facility Permit OB/OD Section P.III.F.(2)(e) Sampling and Analysis Procedures

The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the groundwater monitoring ~~wells~~ **locations** described in Permit Condition P.III.F.(2)(a) to provide a reliable indication of the quality of the groundwater as required under 40 CFR 264.97 as established in 401 KAR 39:090, Section 1:

- Sampling shall occur on a semi-annual basis, which shall be defined as two sampling events each year, with one sampling event in each half of every calendar year and no two events occurring within the same 4 month period
- Samples shall be taken at an interval that assures, to the greatest extent technically feasible, that independent samples are obtained, by reference to the uppermost aquifer's effective porosity, hydraulic conductivity, and hydraulic gradient, and the fate and transport characteristics of the potential contaminants
- Samples shall be collected, preserved, and shipped (when shipped off-site for analysis) in accordance with the procedures specified in Section E-1b(2) of the permit application
- Samples shall be tracked and controlled using the chain-of-custody procedures specified in Section E-1b(2) of the permit application
- Statistical analyses used to evaluate the groundwater monitoring data shall be as described in Section E-1b(2) of the permit application and 40 CFR 264.97 as established in 401 KAR 39:090, Section 1
- All samples taken in accordance with this permit shall not be filtered prior to analysis

3.7 Groundwater Monitoring Report

Hazardous Waste Facility Permit OB/OD Section P.III.F.(2)(f) Recordkeeping and Reporting

• The Permittee shall keep and maintain all monitoring, testing, and analytical data in accordance with Permit Condition F.III.E.
• The Permittee shall submit to the Manager a written report to include all analytical sampling data, established background values, statistical evaluations, groundwater elevations, associated potentiometric maps, and the annual groundwater flow rate and direction determinations. The analytical method and the method detection limit (MDL) for each constituent shall be integrated into all reports of analysis. The report shall be submitted within ~~30~~ **75** days of each sampling event. Copies of this report shall be kept at the facility in accordance with Permit Condition F.III.E.

[40 CFR 264.74 as established in 401 KAR 39:090 Section 1]

3.8 Energetic Wastes Other Than Waste Military Munitions

Hazardous Waste Facility Permit OB/OD Section P.III.A.(1) Permitted Waste Streams, Descriptions, and Codes

Only munitions that are members of the munitions families listed below and that are not prohibited in P.III.A.(3) shall be treated at the OD unit.

Munitions Family	Example Items
Pyrotechnics/Illumination/Tracer	Ammunition used for illumination, marking, spotting, signaling, simulating or tracing
High Explosive Components and Devices	Detonators, boosters, bursting charges not otherwise configured with an ammunition
High Explosive Cartridges	Artillery or gun ammunition with HE projectile and a propelling charge such as 90 mm, 81 mm mortar, 30 mm fuzed and unfuzed cartridges

High Explosive D	Ammunition containing Explosive D (also known as ammonium picrate or yellow D)
Bulk High Explosive	TNT, pentaerythritol tetranitrate (PETN), cyclotetramethylenetetranitramine (HMX), RDX, Comp A, Comp B, Comp C-4, plastic bonded explosives (PBXs), Black Powder, IMX-101
High Explosive Grenades	Hand or rifle grenades containing explosive fillers
High Explosive Depth Charges and Underwater munitions	High explosive marine depth charges and underwater mines
High Explosive Projectiles and Warheads	Projectiles, warheads, mortars or similar devices that do not have a cartridge case, propellant, or rocket motor associated
HE Rocket Warhead	Rocket warheads and fuzes
Demolition Material	Demolition materials such as TNT, C-4, cratering charges, shaped charges, detonating cord, flexible sheet explosives, miscellaneous explosives used as donor material, plastic caps, fuzes, detonation cord
Fuzes	Fuzes (all types)
Land Mines	High explosive filled land mines including anti-tank mines

In addition to the munitions families listed, non-munitions energetic waste streams that are not otherwise prohibited in P.III.A.(3) may be treated at the OB and OD units on a case-by-case basis upon minimum one week in advance notification to KDEP. Items approved by KDEP through this permit modification include metallic debris or components containing residual energetic materials generated during planned decommissioning of the BGAD Washout Facility and addressed in Part C of the permit application.

3.9 Inspection of Erosion Control Structures at the Open Detonation Unit

Hazardous Waste Facility Permit OB/OD Section P.III.XB.(3) Inspections

The Permittee shall conduct inspections of the OD unit in accordance with Procedures to Prevent Hazards, Attachment F, except as otherwise specified below:

- At the end of each operational day, the Permittee shall inspect the area within the Daily Inspection Limit to ensure that any unexploded items, shrapnel, or other debris are discovered and removed or otherwise managed in accordance with Section D-8a(2)(c)(ii) of the Permit Application.
- The Permittee shall inspect the area within the Semi-annual Inspection Limit during the month of July to ensure that any unexploded items, shrapnel, or other debris are discovered and removed or otherwise managed in accordance with Section D-8a(2)(c)(ii) of the Permit Application.
- The Permittee shall inspect the area within the Annual Inspection Limit during the month of December to ensure that any unexploded items, shrapnel, or other debris are discovered and removed or otherwise managed in accordance with Section D-8a(2)(c)(ii) of the Permit

Application. If unexploded items, shrapnel, or other debris are found beyond the Limits of the Open Detonation Permit Area, the occurrence shall be documented with photographs prior to removal, and reported to the Manager within 7 days. Upon the Division's approval of Compliance Schedule Item 8, the Permittee shall follow the provisions of the Management Plan for Materials Ejected Beyond the Open Detonation Unit Boundary.

- At least 7 days prior to conducting a semi-annual or annual inspection, the Permittee shall notify the Division of the date on which the Permittee intends to conduct the inspection.
- The Permittee shall inspect erosion control structures prior to the start of each OD operational season and after any ~~one~~ **two** inch or greater rainfall event.

[40 CFR 264.602 as established in 401 KAR 39:090 Section 1]

3.10 Remove CDC Emissions Testing Compliance Date

Hazardous Waste Facility Permit CDC Section D.III.B.(10) Compliance Schedule

Complete emissions testing for the purpose of confirming and updating the Human Health Risk Assessment shall be conducted to coincide with compliance testing requirements of the Title V Air Permit~~, but no later November 1, 2020~~. Results of the emissions testing will provide baseline 6 emissions for the D-100 CDC. The operating limitations in D.III.X.(3)(a) will be subject to revision based on the results of the amended HHRA.

[40 CFR 270.33 as established in 401 KAR 39:060 Section 5]

3.11 Overnight Storage of Waste Military Munitions at the Controlled Destruction Chamber

Hazardous Waste Facility Permit CDC Section D.III.X.(3)(a) Waste Processing Limits

- In the detonation configuration, no more than 42.5 pounds net explosive weight (NEW) shall be detonated per load (WMM plus donor charge) and no more than 2 packages shall be treated per load.
- In the burn configuration, no more than 6 rockets shall be treated per load. Rocket motors shall be ignited sequentially, not simultaneously.
- Treatment shall not exceed 510 lbs NEW per hour, 10,200 lbs NEW per day, or 2,019,600 lbs NEW per year. These limits will be subject to revision based on the amended Human Health Risk Assessment as required by condition D.III.B.10.
- No waste military munitions shall remain staged at the D-100 CDC for more than five hours.
- No more than 1000 lbs net explosive weight in waste military munitions and donor charges shall be staged at Building 280.
- ~~No waste military munitions shall remain staged at Building 280 overnight. Any untreated waste military munitions remaining at the end of the operating day will be repacked and returned to a permitted storage area.~~

[KRS 224.46-530, 401 KAR 39:090 Section 1 (40 CFR 264.601)]

ATTACHMENT 1

Excerpts from AMC Regulation 755-8 and

OB/OD/CDC Risk Assessment Report

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY MATERIEL COMMAND
5001 EISENHOWER AVENUE, ALEXANDRIA, VA 22333-0001

AMC REGULATION
NO. 755-8

19 February 2003

Disposal of Supplies and Equipment

AUTHORIZING, ACCOMPLISHING, AND REPORTING DEMILITARIZATION OF CLASS V MATERIELS

Supplementation is prohibited unless prior approval is obtained from the Commander, Army Materiel Command, ATTN: AMCOPS-SCL.

This regulation supersedes AMC-R 755-8, 12 April 1995, October 1986, and change 1, 21 July 1988.

This regulation supersedes AMC-R 755-8, 12 April 1995, October 1986, and change 1, 21 July 1988.

(1) Materiel recovered from materiel testing areas can be fully functioned items or items that did not function as intended.

(a) Fully functioned items could possibly contain negligible quantities of PEP and are considered as PEP-contaminated materiel. These items are required to be decontaminated due to safety considerations, as discussed in paragraph d above, before release for recycle/disposition. These items must be treated at sites designated for treatment of PEP contaminated materiel.

(b) Items that did not function as intended will be detonated in place if safety considerations dictate. Those which can be recovered and safely moved per the appropriate safety regulations and will be treated in a RCRA regulated treatment/storage/disposal (TSD) facility. All requirements covered in this policy for hazardous waste operations will apply.

(2) Whenever feasible, fully functioned (non-hazardous waste) items should be separated from items that did not function as intended to minimize the quantities of materiel treated in a permitted PEP treatment facility.

3-8. Weather.

a. When conducting Open Burning/Open Detonation (OB/OD) and static firing demilitarization operations, special attention will be given to the weather conditions. In order to assure that appropriate weather conditions are considered, each installation having an OB/OD or static firing demilitarization area will have a survey conducted by the Center for Health Promotion and Preventive Medicine (CHPPM) formerly the U.S. Army Environmental Hygiene Agency (USAEHA). The purpose of this survey is to provide assistance in complying with the monitoring, recording, and operational requirements of this regulation. Installations will submit requests for survey through command channels to Commander, U.S. Army Materiel Command, ATTN: AMCIS-A, 5001 Eisenhower Avenue, Alexandria, VA 22333-0001.

b. Installations will record and maintain weather data whenever OB/OD or static firing demilitarization operations are conducted. A weather data checklist is provided at appendix B, which includes sources for obtaining weather information, recording intervals and go-ahead limits. In order to ensure favorable weather conditions exist, a weather forecast consisting of the conditions listed in Appendix B, will be obtained and recorded prior to scheduling daily demilitarization operations for that shift. If all factors required by Appendix B, are favorable, preparations for detonations, burns and static firings may begin. Immediately prior to the execution of each operation, the conditions required by Appendix B, will be recorded. Copies of the completed weather data forms will be maintained by the installation environmental coordinator for a minimum of 3 years.

c. Compliance with the following conditions for OB/OD or static firing demilitarization operations will be followed unless local, State, or Federal regulations or permit requirements are more stringent:

(1) Operations will not be conducted during electrical storms, thunderstorms, or during periods of forecasted high probability (50 percent or greater as given by the local National Weather Service (NWS) or as determined by experienced OB/OD operations personnel) of such.

(2) Operations will not be conducted during periods of precipitation or high probability (75 percent or greater as given by the NWS or as determined by experienced OB/OD operations personnel) of such.

(3) Operations shall be restricted to periods when surface average wind-speed is equal to or greater than 3 miles per hour and equal to or less than 20 miles per hour, with gusts less than 30 miles per hour and from a direction which will not carry emission products over any publicly accessible area within 1 mile of the demilitarization site.

(4) Operations will not be conducted during periods of reduced visibility (less than 1 mile).

(5) Operations shall not be carried out when the estimated cloud cover is greater than 80 percent and the cloud ceiling is estimated at less that 2000 feet.

(6) OB/OD operations shall not be initiated until at least one-half hour after sunrise and will be concluded by at least one-half hour before sunset.

(7) OB/OD operations will not be conducted during periods of local air quality advisories/alerts.

(8) Installations will operate under any and all constraints identified by the Installation Compatible Use Zone (ICUZ) Plan.

d. If all of the above operational requirements are met, inversion conditions should not be a problem for either open burning or static firing demilitarization operations. For open detonation operations, under some conditions, an inversion or other weather parameters may occur, resulting in noise complaints. If this should happen, assistance may be requested from Commander, U.S. Army Materiel Command, ATTN: AMCIS-A, 5001 Eisenhower Ave., Alexandria, VA 22333-0001.

3-9. Security.

Procedures providing for the security on munitions within AMC are as prescribed by DOD 5100.76-M, Chapter 12 of DOD 5160.65-M, and AR 190-11. There are no separate security procedures and/or requirements relative to the handling of items identified for demilitarization. All items designated as sensitive and assigned a risk category retain that status until such time as demilitarization or other re-certification criteria has been in fact accomplished.

Code	Condition
0	Clear (Less than 1/10 cloud cover)
1	Scattered clouds (1/10 to 1/2 cloud cover)
2	Broken clouds (6/10 to 8/10 cloud cover)
3	Overcast (8/10 or more cloud cover)
4	Rain

(13) MATERIEL DESTROYED. If weather conditions permit materiel destruction, indicate the type of operation and the amount and type of materiel that is to be destroyed and the Ammunition Transfer Record (DA Form 4508) number. Otherwise, enter "NO OPERATION" and circle the weather condition which limits the operation.

B-3. Weather data checklist. Forecast data required prior to detonation/burn/static fire:

a. Date – Self-explanatory.

b. Time – ½ hour after sunrise and ½ hour before sunset.

c. Site – demolition grounds or disposal site.

d. Probability of precipitation – greater than or equal to 75 percent. Information is obtained from the National Weather Service (NWS) or local weather service or expertise.

e. Probability of thunderstorm – greater than or equal to 50 percent. Information is obtained from the NWS or local weather service or expertise.

f. Probability of electrical storm – greater than or equal to 50 percent. Information is obtained from the NWS or local weather service or expertise.

g. Wind speed – between 3 and 20 miles per hour as measured onsite.

h. Wind direction – demolition limitations caused by wind direction is an installation unique factor.

i. Cloud cover – greater than or equal to 80 percent. Information is obtained from the NWS or local weather service or expertise.

j. Cloud ceiling height – greater than or equal to 2000 feet. Information is obtained from the NWS or local weather service or expertise.

k. Air pollution advisory or alert – demolition limitations caused by air pollution is an installation unique factor and would be determined by the local Health Department.

l. Visibility – greater than or equal to 1 mile. Information is obtained from the NWS or local weather service or expertise.

BLUE GRASS ARMY DEPOT

AIR MODELING AND RISK ASSESSMENT FOR THE OPEN BURNING UNIT, OPEN DETONATION/BURIED DETONATION UNIT, AND CONTROLLED DESTRUCTION CHAMBER

Volume II of Hazardous Waste Facility Permit, RCRA Hazardous Waste Treatment Permit Application for Conventional Munitions by Open Burning and Open/Buried Detonation, EPA ID# KY8-231-820-105

Prepared for:

US Army Corps of Engineers
Mobile District

September 2016
Revised June 2017

TABLE 3-1
Meteorological Restrictions for the OB and OD/BD Units
Blue Grass Army Depot, Madison County, KY

Restriction	OB Unit	OD/BD Unit	Modeled Values
Hours of Operation	OB operations will not be initiated until at least one-half hour before sunrise and will be completed by at least one-half hour before sunset.	OD/BD operations will not be initiated until at least one-half hour before sunrise and will be completed by at least one-half hour before sunset.	OB and OD/BD events modeled only during hours of daylight.
Wind Speed	No wind speed restrictions.	OD/BD operations will be initiated only when wind speeds are greater than 3 mph and less than 20 mph.	OB events modeled for all wind speeds. OD/BD events modeled when wind speed is greater than 3 mph and less than 20 mph.
Wind Direction	No wind direction restrictions.	OD/BD operations will be curtailed when winds blow from directions that approximately encompass the clockwise angle from 300 through 65 degrees (north = 360 degrees).	OB events modeled for all wind directions. OD/BD events will not be modeled when the wind is blowing from 300 degrees through 65 degrees.
Precipitation	OB operations will not be initiated during periods of precipitation or high probability of such (50 percent or greater).	OD/BD operations will not be initiated during periods of precipitation or high probability of such (75 percent or greater).	OB and OD/BD events will not be modeled during hours of precipitation.

Notes:

mph – mile(s) per hour
OB – Open Burning
OD/BD – Open Detonation/Buried Detonation

Executive Summary

This report presents the air modeling and human and ecological risk assessments for the combined emissions of the Open Burning (OB), Open Detonation/Buried Detonation (OD/BD), and D-100 Controlled Destruction Chamber (CDC)[1] conventional munitions treatment units at the Blue Grass Army Depot (BGAD) in Richmond, Kentucky. This report, originally submitted in September 2016, has been revised to address Kentucky Department for Environmental Programs (KDEP) comments dated January 18, 2017 (KDEP, 2017).

The results of the Human Health Risk Assessment (HHRA) and Screening Level Ecological Risk Assessment (SLERA) described herein support the environmental compliance standards demonstration (i.e., a demonstration that hazardous waste units can be operated in a manner that does not pose unacceptable risk to human health and the environment) required by 40 Code of Federal Regulation (CFR) 264 Subpart X.

This report comprises Volume II of the complete Resource Conservation and Recovery Act (RCRA) Subpart X permit application for the OB and OD/BD treatment units and the RCRA Subpart X permit application for the CDC treatment unit. Volume I for the OB and OD/BD treatment units [*Hazardous Waste Facility Permit, RCRA Hazardous Waste Treatment Permit Application for Conventional Munitions by Open Burning and Open/Buried Detonation, EPA ID# KY8-231-820-105, Volume 1, June* 2016 (CH2M, 2016)] includes the Part A and Part B applications and was submitted to KDEP under separate cover dated June 6, 2016. Volume I for the CDC treatment unit [*Hazardous Waste Facility Permit, RCRA Hazardous Waste Treatment Permit Application for Conventional Munitions in the Controlled Destruction Chamber, EPA ID# KY8-231-820-105, Volume 1*] is pending future submittal.

The methods and approaches used in the air modeling and risk assessments were documented in the *Air Modeling and Risk Assessment Protocol for Thermal Treatment Unit Operations at the Open Burn Unit, Open Detonation/Buried Detonation Unit, and Contained Detonation Chamber, Blue Grass Army Depot, Richmond, Kentucky, Draft Technical Memorandum Revision 01* ("Protocol"; CH2M, 2014) amended as discussed during a consensus meeting with KDEP on September 30, 2015, documented in meeting minutes dated October 11, 2015 ("Meeting Summary"; CH2M, 2015), and subsequent information exchange. Any deviations from these are noted in this report and the rationale for the deviation presented. In response to KDEP Comments (KDEP, 2017), this report has been expanded to incorporate details regarding methods and approaches described in the Protocol and Meeting Summary.

The objective of the risk assessments is to conservatively evaluate the potential future risks to human and ecological receptors from continued operations of the BGAD conventional munitions treatment units (OB, OD/BD, and CDC) (assuming an additional 30-year active life) using reasonable maximum estimates of exposure. The locations of the expected maximum impacts to onsite (within Depot boundaries) and offsite (outside the Depot boundaries) human and ecological receptors were evaluated from air dispersion modeling. The air dispersion modeling is a conservative assessment that characterizes air pollutant concentrations resulting from OB, OD/BD, and CDC operations at BGAD. The air dispersion analysis was conducted with the U.S. Environmental Protection Agency

[1] Note that the CDC was previously termed Confined Detonation Chamber. This nomenclature has been changed to recognize the broader capabilities of the CDC for controlled static burning or rocket motors.

(EPA)-approved American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD; Version 15181, the most current version available at the time of modeling) dispersion modeling system using the worst-case input parameters.

A multi-pathway screening level approach is used for the HHRA. The screening approach is based on more conservative assumptions, focusing on theoretical maximally exposed individuals instead of individuals at known locations, with the idea that if the estimated risks for these individuals are acceptable, the risks to the general population also would be acceptable. In the HHRA, the Industrial Risk Assessment Program-Health (IRAP-*h*) View program, Version 4.5.6, the most current version available at the time of modeling, created by Lakes Environmental Software (Lakes, 2014), was used to compute chemical concentrations in potentially affected exposure media (soil, water, and biota), chemical intakes by human receptors, and potential human health risks. The IRAP-*h* View program was developed following the requirements and recommendations from the 2005 *Final Human Health Risk Assessment Protocol (HHRAP) for Hazardous Waste Combustion Facilities* (EPA, 2005a).

The SLERA too is a screening level assessment. It uses high-end or conservative assumptions for exposure scenarios, receptor locations, media concentration modeling, and exposure parameters. The SLERA assesses the potential future ecological risks for facility-related chemical constituents in ecologically relevant media (surface water, sediment, and surface soil), as evaluated from air dispersion and deposition modeling based on a set of facility operating conditions. Inhalation exposures to air also were evaluated in a semi-quantitative manner consistent with applicable ecological risk assessment (ERA) guidance. The characterization of ecological risks involved identifying the potential exposures of ecological receptors at or near the conventional munitions thermal treatment units and evaluating the potential effects associated with such exposures. The SLERA assumed that all potential terrestrial receptors reside at the theoretical (hypothetical) maximally exposed location (i.e., the location with the highest air concentrations and/or total deposition) both inside and outside the boundaries of BGAD. Deposition estimates in several water bodies located within the boundaries of BGAD (modeled at their actual locations) also were used in the SLERA.

Uncertainties are present in all risk assessments because of the limitations of the available data and the need to make certain assumptions and extrapolations based on incomplete information. In addition, the various models (for air dispersion, deposition, uptake, and food web exposures) each carries with it some associated uncertainty as to how well the model reflects actual conditions. Uncertainties resulting in underestimated risks have been minimized in the risk assessment process by using conservative assumptions. The nature of the key assumptions used in the risk assessments and their influence on the numerical risk estimates are elaborated in the report.

The risk estimates presented in this HHRA indicate that combustion operations at BGAD, under the conditions studied (specific material mass and burn times of waste disposal activities; propellant, explosive, and pyrotechnics characteristics; and operation schedule assumed in the model), result in chronic risks below the regulatory thresholds. The results of the HHRA indicate that the estimated risks are below the chronic target levels (Excess Lifetime Cancer Risk [ELCR] of 1×10^{-5} and a non-carcinogenic Hazard Index [HI] of 0.5) for individual exposure scenarios. Estimated lead concentrations in air, surface water, and soil are also below the lead screening levels; therefore, modeled lead exposures are considered acceptable. Results of acute inhalation exposures additionally show that all of the estimated Acute Hazard Quotient (AHQs) are below the AHQ threshold of 1, except for lead (primarily from the OB source) at the modeled Maximally Exposed Location, which occurs just north and east of the two OB burn pans within the Demo Grounds area of BGAD. Access to this area is restricted from the public. Access to BGAD personnel is limited and

controlled, and exposure will be mitigated through administrative controls and personnel protective equipment.

The results of the SLERA indicate that risks to terrestrial, wetland, and aquatic ecological receptors (including sensitive habitats and species) from continued operation of the conventional munitions treatment units are acceptable.

ATTACHMENT 2

Figure E2a

N

SP-75

4004D03

4004D05

Annual Inspection Limit

4004D04

Semi-Annual Inspection Limit

Daily Inspection Limit

4004C06

4004C05

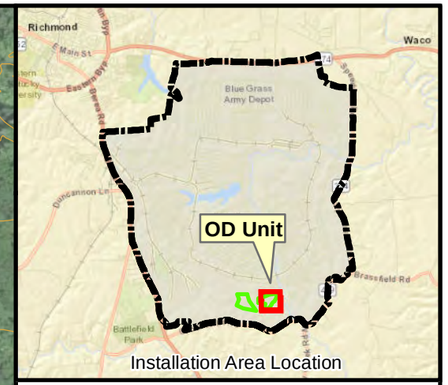
4004C04

4004C02

4004C03

4004C01

4004C10



Installation Area Location

Legend

- Seep in the Vicinity
- Daily Inspection Limit
- Semi-Annual Inspection Limit
- Annual Inspection Limit

Other Boundary Limits

Name

- Approximate Limits of Permitted OD Area (CURRENT)
- Approximate Limits of Permitted OD Area (HISTORICAL)
- Index Contour
- Intermediate Contour
- Monitoring Well Location
- Installation Boundary

Blue Grass Army Depot
Richmond, KY

Figure E-2a: Open Detonation Area Monitoring Wells

Prepared By: TLI Solutions

Drawn: R Buttrey	Date: 5/19/2020

0 100 200 400
Feet

Service Layer Credits: Esri ArcGIS Online Aerial Photography

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ATTACHMENT 3

Figure E2b

N

Daily Inspection Limit

Burn Pad #1

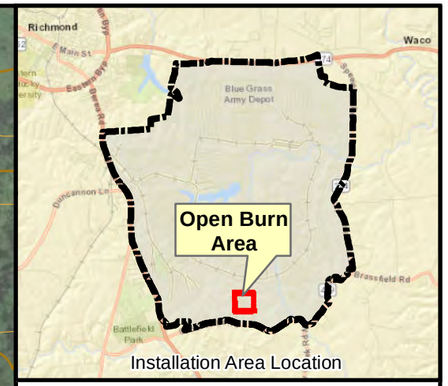
Burn Pad #2

Semi-Annual Inspection Limit

SP-64

4004B01A(u)

SP-1



Installation Area Location

Legend

- Seep in the Vicinity
- Daily Inspection Limits
- Approx. Limits of the Open Burn Permit Area
- Monitoring Wells
- Installation Boundary
- Index Contour
- Intermediate Contour

Blue Grass Army Depot
Richmond, KY

Figure E-2b:
Open Burn Area

Prepared By: TLI Solutions

Drawn: R Buttrey | **Date: 5/19/2020**

0 100 200 400
Feet

Service Layer Credits: Esri ArcGIS Online Aerial Photography

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ATTACHMENT 4

Section E, OB/OD Permit Application

PART E. PROTECTION OF GROUNDWATER [401 KAR 38:090 Section 4 & 40 CFR 270.14(c)], ENVIRONMENTAL PERFORMANCE STANDARDS [401 KAR 34:250 Section 2 & 40 CFR 264.601] and INFORMATION REQUIREMENTS FOR SOLID WASTE MANAGEMENT UNITS [401 KAR 38:090 Section 5 & 40 CFR 270.14(d)]

This Part E of the permit application consolidates the information required for protection of groundwater; the Environmental Performance Standards demonstration for prevention of releases that may have adverse effects on human health or the environment due to migration of waste constituents to the surface, subsurface, groundwater, surface water and wetlands; and the information requirements for solid waste management units (SWMUs). The Environmental Performance Standard for prevention of releases that may have adverse effects on human health or the environment due to migration of waste constituents in air are addressed in the air modeling and risk assessment presented in Volume II to this application.

E-1 Protection of Groundwater [401 KAR 38:090 Section 4 & 40 CFR 270.14(c)]

401 KAR 38 requires that specific information be provided by owners or operators of hazardous waste facilities containing a *regulated unit*. A *regulated unit* is defined in 401 KAR 34:060 as a surface impoundment, waste pile, or land treatment unit or landfill that receives hazardous waste. OB and OD of explosive wastes is specifically listed as examples of the types of units covered under Subpart X at 46952 FR and is are not defined as regulated units under 401 KAR 38. Nonetheless, OD/BD treatment does incorporate the soil as part of its engineering design and 401 KAR 34:250 does require that detailed hydrologic and geologic assessments be provided in order to demonstrate compliance of the miscellaneous units with each component of the Environmental Performance Standards of 401 KAR 34:250. Therefore, the following information is provided in support of the Environmental Performance Standards for groundwater protection, 401 KAR 30:031 Section 5.

E-1a Interim Status Groundwater Data [401 KAR 38:100 Section 2(1) & 40 CFR 270.14(c)(1)]

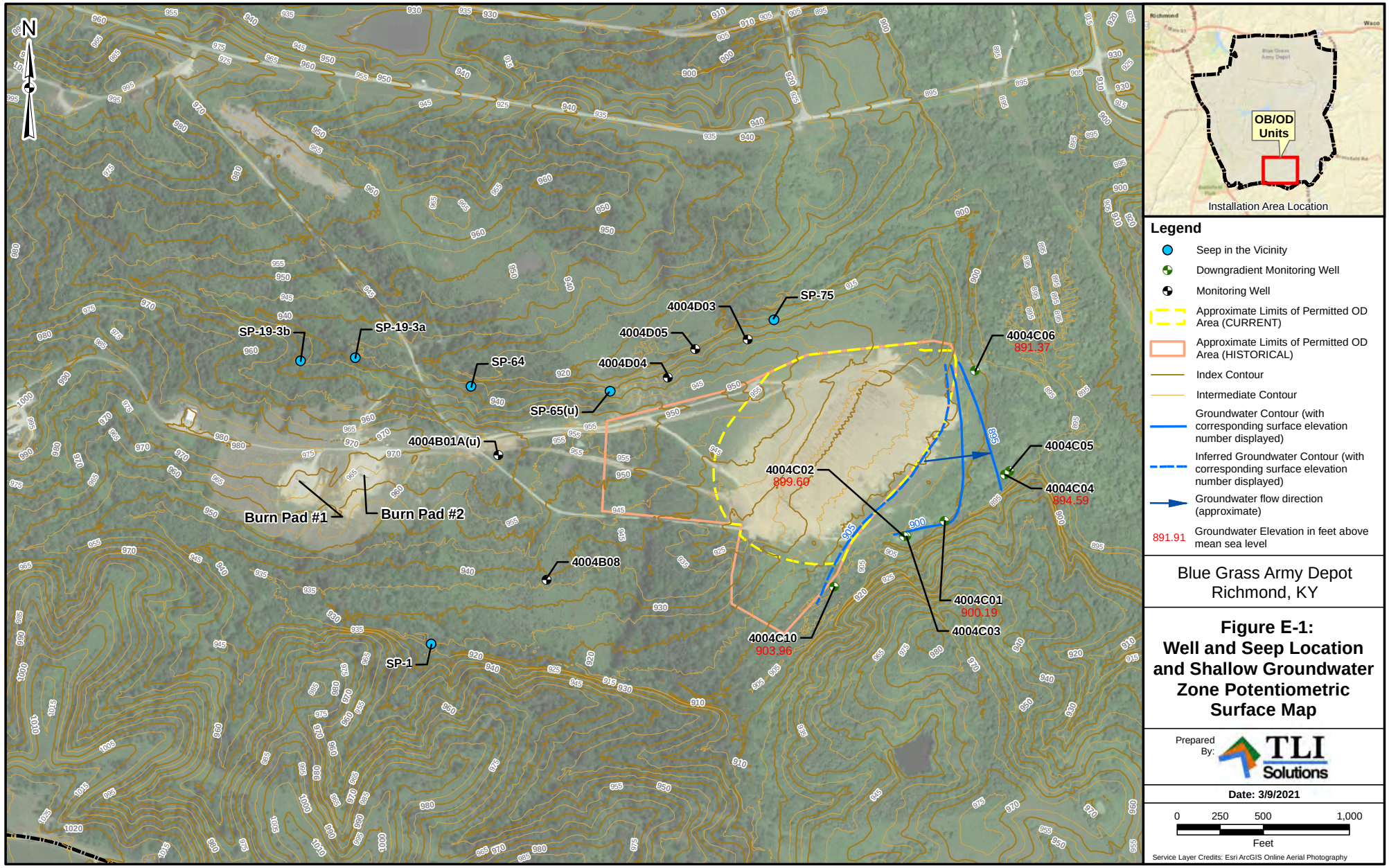
Three permanent groundwater monitoring wells (MW4004C01 through MW4004C03) were installed at the OD/BD unit in 1989 to monitor the shallow groundwater system associated with RCRA Facility Investigation (RFI) of former operations. These wells are located downgradient of the southwest portion of the OD/BD unit. As a result of a hydrologic evaluation performed at the OD/BD unit from March to September 1998, it was determined that additional wells were needed in order to meet the point of compliance (POC) monitoring requirements for a RCRA regulated unit. Five additional permanent groundwater monitoring wells (MW4004C04, MW4004C05, MW4004C06, MW4004C08, and MW4004C09) were installed at the boundary of the OD/BD unit on April 6 through 15, 1999. The POC groundwater monitoring network for the OD/BD unit was established in coordination with KDEP and as presented in the Work Plan[1]. Wells MW4004C04, MW4004C05, and MW4004C06 were installed downgradient of the OD/BD unit to evaluate the potential impact of OD operations on groundwater quality. Wells MW4004C04 and MW4004C05 were installed in a cluster. Well MW4004C06 was installed as a single shallow well. Well MW4004C07 had been designated to be a deep well adjacent to MW4004C06. The borehole for this well was left open for 5 days, and no water recharged into the borehole. It was determined in the field that this well would not bear water, and MW4004C07 was properly abandoned per KDEP requirements. Monitoring wells MW4004C08 and MW4004C09 were installed upgradient of the OD/BD unit to represent background groundwater for this area. Well MW4004C08 was intended to represent the upgradient deep well screened across the Ashlock Formation. Well MW4004C09 was intended to represent the upgradient shallow well, screened where water was first encountered.

The two upgradient monitoring wells, MW4004C08 and MW4004C09, were abandoned in January 2002 with the approval of KDEP Division of Waste Management, per the recommendations of the Phase II Sitewide Groundwater Assessment Report[2]. The monitoring wells were identified for abandonment due to the lack of groundwater production and poor surface conditions. A new shallow upgradient monitoring well, MW4004B01A, was installed northwest of the OD/BD unit in December 2001 and was incorporated into the monitoring well network.

In its response to the Phase II Sitewide Groundwater Assessment, KDEP requested the installation of an additional downgradient shallow monitoring well (designated MW4004C10) located southwest of MW4004C02, and incorporation of seep SP-65 to the compliance monitoring system. MW4004C10 was installed in January 2002 and monitors the southwest boundary of the OD/BD unit. There are currently eight existing groundwater monitoring wells (MW4004C01, MW4004C02, MW4004C03, MW4004C04, MW4004C05, MW4004C06, MW4004C10, and MW4004B01A) available for monitoring groundwater quality at the OD/BD unit. MW4004B01A historically ~~currently~~ serveds as the background well for the hydrologic unit containing the OD/BD unit, but was chronically dry and/or not yielding. Figure E-1 shows the estimated limits of the OD/BD unit and the monitoring well and seep locations that currently comprise the point of compliance monitoring well network. Monitoring well logs and as-builts for the POC monitoring wells are included in Appendix E-1.

[1] Radian International. 1998. *Work Plan for Monitoring Well Installation and Groundwater, Surface Water and Sediment Sampling Activities at the Open Detonation Area*. October.

[2] URS. 2001. P*hase II Sitewide Groundwater Assessment Monitoring System Evaluation Final Report*. May.


N
SP-19-3b
SP-19-3a
SP-64
SP-65(u)
4004B01A(u)
Burn Pad #1
Burn Pad #2
4004B08
SP-1
4004D03
4004D05
4004D04
SP-75
4004C06
891.37
4004C05
4004C02
899.60
4004C04
894.59
4004C01
900.19
4004C03
4004C10
903.96
OB/OD Units
Installation Area Location
Legend
Seep in the Vicinity
Downgradient Monitoring Well
Monitoring Well
Approximate Limits of Permitted OD Area (CURRENT)
Approximate Limits of Permitted OD Area (HISTORICAL)
Index Contour
Intermediate Contour
Groundwater Contour (with corresponding surface elevation number displayed)
Inferred Groundwater Contour (with corresponding surface elevation number displayed)
Groundwater flow direction (approximate)
891.91
Groundwater Elevation in feet above mean sea level
Blue Grass Army Depot
Richmond, KY
Figure E-1:
Well and Seep Location and Shallow Groundwater Zone Potentiometric Surface Map
Prepared By:
TLI Solutions
Date: 3/9/2021
0
250
500
1,000
Feet
Service Layer Credits: Esri ArcGIS Online Aerial Photography

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In 2004, BGAD, in coordination with KDEP, implemented a site-wide program of long-term monitoring (LTM) in accordance with the KDEP-approved LTM Operations and Maintenance (LTMOM) plan[3]. Due to the active status of the OD/BD unit, groundwater monitoring under the DoD's Installation Restoration Program (which funded the site-wide LTM program) initially was not to be included in the program. However, allowances were made, and the wells and seeps at the OD/BD unit were incorporated into the annual LTM program in 2004. The wells and seep were later determined not to be eligible and were removed from the LTM program in 2011.

LTM is conducted in accordance with the approved Long-Term Sampling and Analysis Plan (LTSAP). The overall LTM program includes monitoring of groundwater, surface water, sediment, springs/seeps, and landfill gas at the Mustard Burn Area, Pink Water Pond, Former Waste Ammo Area, Old Landfill, New Landfill and Perimeter Well 400201, Old TNT Lagoon Area, Fire Training Area, and New TNT Washout Area, and included the OD/BD unit from 2004 through 2010. LTM sampling results are presented to KDEP annually in the Long-Term Sampling and Analysis Program Annual Reports.

E-1a(1) Summary of Groundwater Monitoring Data Obtained During Interim Status Period [40 CFR 270.14(b)(c)(1)]

In January 1996, a site investigation of the Former Waste Ammunition Detonation Area, located just outside of the southern OD/BD unit boundary, showed explosive and metal constituents in the groundwater[4]. At the same time, a groundwater study of the Mustard Burn Site/Mustard Trenches Area located along the northern boundary of the OD/BD unit was completed, showing detectable levels of three explosive constituents and seven metals[5]. In February 1996, groundwater samples were collected from MW4004C01, MW4004C02, and MW4004C03 within the cleared area on the southwest side of the OD/BD unit and analyzed for total and dissolved metals by Method 6010/7470/7471 and explosives by Method 8330. Results indicated the presence of both metal and explosive constituents in the groundwater[6]. However, the studies summarized that the low concentration levels did not indicate an unacceptable level of risk to human health or the environment.

All available groundwater monitoring results for the OD/BD unit from 1997 through 2010 are summarized in the figures and graphs included in Appendix E-2. For a more complete description, refer to the appropriate LTSAP Annual Reports on file at the BGAD Environmental Office and/or as provided to KDEP. Analyses performed for the OD/BD unit included explosives (2,4,6-Trinitrotoluene, 2-Amino-4,6-dinitrotoluene, 4-Amino-2,6-dinitrotoluene, 3-Nitrotoluene, HMX and RDX) and metals (aluminum, arsenic, barium, beryllium, cadmium, chromium, lead, manganese, mercury, selenium, silver and zinc). The results of analyses under the LTM program were compared to agreed-to Applicable or Relevant and Appropriate Requirements (ARARs) as a screening tool. These groundwater ARARs were developed as discussed in the LTMOM plan from a review of existing standards at the time (May 2004) to include: (1) U.S Environmental Protection Agency (EPA) MCLs (2) Drinking Water Equivalent Levels (DWELs) determined from exposure concentrations protective of adverse, non-cancer health effects (3) Water Quality for the Protection of Human Health from the Consumption of Fish Tissue (401 KAR 5:031 Section2) (4) Warm Water Aquatic Habitat Criteria (401 KAR 5:031 Section 4), and (5) Domestic Water Supply Use (DWSU) Standards (401 KAR 5:031 Section 5). Following review of these standards, the groundwater ARARs were generally adopted from the MCL for each constituent. Where a MCL was not

[3] URS Corporation.2004. S*ite-wide Long-Term Monitoring, Operations, and Maintenance Plan at Blue Grass Army Depot, Richmond, Kentucky*. May.

[4] Sverdrup Environmental, Inc. 1996. *Final Site Investigation (SI) Report for the Former Waste Ammunition Detonation Area (SWMU #7)*, January.

[5] Sverdrup Environmental, Inc. 1996. *Final Interim Remedial Action Plan Study, Groundwater at the Mustard Burn Site/Mustard Trenches Area (SWMU #2)*, January.

[6] Sverdrup Environmental, Inc. 1996. *Final Letter Report for the Groundwater Sampling at the OD Area (SWMU #1)*, February.

available, the DWEL was used. The figures included in Appendix E-2 summarize the metal and energetics detections for the OD/BD unit from1997 to 2010. Detected constituents that exceeded their ARARs are shown in red print; detected constituents that have never exceeded an ARAR at a given location are not illustrated.

During the most recent LTM sampling event that included the OD/BD unit in 2010, total arsenic was reported above the ARAR of 10 micrograms per liter (µg/L) from shallow well MW4004C01 at a concentration of 22.2 µg/L, total cadmium was detected above the ARAR of 5 µg/L in MW4004C04 at a concentration of 33.5 µg/L, and total lead was detected above the ARAR of 15 µg/L in MW4004C04 and MW4004C06 at concentrations of 33.7 µg/L and 31.3 µg/L, respectively. All other metals and all energetic detections during the 2010 LTM sampling event were below detection or below their respective ARARs. Appendix E-2 additionally includes trend plots for total arsenic, cadmium, lead, and selenium that exceeded ARARs in one or more wells. No statistical analyses were prepared for the historical data set. Comparison to upgradient well results was frequently hampered because of insufficient well volume in MW4004B01A.

Wells associated with the OD/BD unit were last sampled in November ~~October~~ to December 2020~~November 2015~~ and results reported to KDEP in a Technical Memorandum[7]. Included within the reported groundwater sampling event were seven downgradient groundwater wells (MW4004C01, MW4004C02, MW4004C03, MW4004C04, MW4004C05 and MW4004C10) and two seeps (SP-65 and SP-19-3b)~~one seep (SP-65)~~. In lieu of sampling upgradient groundwater monitoring well MW4004BO1A (which is permanently dry and/or not yielding), and with concurrence from KDEP, seep SP-19-3b was sampled to evaluate its potential~~feasibility~~ to serve as a background location for the OD/BD POC network also for a future OB POC network.~~The identified upgradient groundwater well (MW4004B01) was dry and no samples could be extracted or reported.~~ The following analyses were completed:

E353.2	Nitrate/Nitrite
SW6010	Metals (Total and Dissolved)
SW7470/7471~~6020~~	Metals (Total and Dissolved)
SW6850	Perchlorate
SW7470	Mercury
SW8260B	Volatile Organic Compounds (VOCs) [Benzene, Trichloroethylene, and 1,4-Dioxane]
SW8270	SVOCs [Dimethylaminoazobenzene and 2,4-Dinitrophenol]
~~SW8270SIM~~	~~SVOCs~~
SW8330B	Explosives
SW9012A	Cyanide

Results were compared to the groundwater protection standard values, Table F2 of the Hazardous Waste Management Facility Permit, May 20, 2019.~~EPA MCLs for drinking water and regional screening levels (RSLs) for tap water although groundwater at BGAD does not serve as a drinking water source.~~

- VOCs – ~~Two VOCs were detected above EPA tap water RSLs but below MCLs for drinking water. Benzene was detected in MW4004C05 at 1.5 µg/L. The EPA tap water RSL for benzene is 0.46 µg/L, while the MCL for drinking water is 5 µg/L.~~ Trichloroethene (TCE) was detected at 0.94~~1.7~~ µg/L in MW4004C02 and at 1.8~~2.1~~ µg/L in MW4004C04. The MW4004C02~~Both of these~~ result~~s~~ is~~are~~

[7] TLI Solutions 2020~~CH2M 2016~~. Technical Memorandum: *Groundwater and Seep Sampling Results and Data Validation Summary, Open Detonation Area, Blue Grass Arm Depot, Richmond, Kentucky.* March 9~~8~~.

estimated (i.e., "J" qualified). The groundwater protection standard is ~~EPA tap water RSL for TCEtrichlorethene is 0.49 µg/L, while the MCL for drinking water is~~ 5 µg/L. VOCs were not detected in the seep SP-19-3b sample.

- SVOCs – No ~~One~~ SVOCs were~~as~~ detected ~~above EPA tap water RSLs. Dimethlyaminoazobenzene was detected in MW4004C03 at 1.3 µg/L. This result is estimated (i.e., "J" qualified)~~ in any well or seep~~. The EPA tap water RSL for dimethylaminoazobenzene is 0.005 µg/L. There is currently no published MCL for this chemical. SVOCs were not detected in the seep sample.~~

- Metals – Cadmium was~~Two metals were~~ detected above the groundwater protection standard of 5 µg/L ~~EPA tap water RSLs. Arsenic was detected in MW4004C01 at 2.6 µg/L. This result is estimated (i.e., "J" qualified). The EPA tap water RSL for arsenic is 0.052 µg/L. The drinking water MCL however is 10 µg/L. Cadmium was detected~~ in one well (~~-~~MW4004C04) at a concentration of 40.9 µg/L totals and 42.1~~61~~ µg/L dissolved. ~~The EPA tap water RSL is 9.2 µg/L, while the MCL for drinking water is 5 µg/L.~~ No other metals were detected above groundwater protection standards in any well. No metals were detected above groundwater protection standards in the seep SP-19-3b sample~~s~~.

- Cyanide – Cyanide was not detected in any well or seep~~detected above the EPA tap water RSL but below the MCL for drinking water. Cyanide was detected in MW4004C04 at 10 µg/L. The EPA tap water RSL is 1.5 µg/L, while the MCL for drinking water is 200 µg/L~~.

- Nitrate/Nitrite – Nitrate/Nitrite was reported as detected in 3~~5~~ of 8~~6~~ wells and in seep~~s~~ SP-65 ~~sampled~~. No result was above the groundwater protection standard. Seep SP-19-3b was not sampled for nitrate/nitrite during this sample event.

- ~~-~~Perchlorate – Perchlorate was ~~not~~ detected below the groundwater protection standard (i.e., 15 µg/L) in MW4004C06 at 1.4 µg/L~~in any well~~.

- Perchlorate was not detected in seep SP-19-3b.

- Explosives – One explosive was detected above the groundwater protection standard of 0.7 µg/L. ~~EPA tap water RSL.~~ RDX was detected in MW4004C04 at 11~~6.8~~ µg/L and in MW4004C06 at 1.1~~5.8~~ µg/L. ~~The EPA tap water RSL is 0.7 µg/L.~~ RDX was additionally detected at 0.096 µg/L ~~-~~in MW4004C10 and at 0.25~~2.3~~ µg/L in the seep SP-65 sample. The SP-65 result is estimated (i.e., "J" qualified). No explosives were detected in Seep SP-19-3b.

In summary, results generally show the presence of low level concentrations of constituents in shallow groundwater beneath the OD/~~DB~~BD unit that may be associated with historical and/or current WMM/energetic waste treatment at the OD/BD unit. Shallow groundwater contamination at the Depot is not localized at the OD/BD unit, but occurs at other sites as well. Of the maximum concentration limits for constituents identified in Table 1 of 40 CFR 264.94, only cadmium exceeded the criteria during the most recent (2020~~15~~) sampling event. No statistical analyses (40 CFR 264.97(b)) has been performed to date. It is also noted that the primary site constituents of potential concern (COPCs), including explosives, perchlorate, VOCs and SVOCs~~, including HMX and RDX (explosives)~~, were not detected at seep SP-19-3a, and that none of the seep SP-19-3b sample results exceeded groundwater protection standards. Based on the results of the 2020 sampling event and consistent with the KDEP recommendation, seep SP-19-3a is proposed for use as representative of background quality for the OD/BD unit in statistical evaluations beginning in 2021~~ and the historical data are not known to be of a quality or in a format for such an analysis. In addition, due primarily to the lack of a productive upgradient well, background quality has not been established for the OD/BD unit~~.

E-1a(2) Identification of the Aquifer, Groundwater Flow Direction and Rate [40 CFR 270.14(b)(c)(2)]

Groundwater elevation data from the monitoring well network indicate that two separate flow systems are being monitored at the OD/BD unit. POC wells MW4004C04 and MW4004C06 are screened in the first groundwater encountered, which generally occurs at the soil/bedrock interface. MW4004C03 and MW4004C05 are screened across the first water-bearing structures below the shallow water-bearing zone.

Groundwater elevation data collected during previous investigations and sampling events were used to evaluate groundwater flow conditions at the OD/BD unit. The data indicate that uppermost groundwater is generally present at the soil/rock interface for most of the year and that it moves down the slope of this horizon. The slope of the soil/rock interface generally mimics the downhill direction of the ground surface topography, which results in groundwater flow to the east and southeast beneath the OD/BD unit. Figure E-12 is a shallow groundwater piezometric map generated from the most recent (20210) groundwater monitoringLTM results and showing OD/DBBD unit wells and the interpreted groundwater flow direction.

The groundwater velocity of the shallow groundwater system beneath the OD/BD unit was calculated in 1999 using the water table elevation map of the soil/bedrock groundwater data that are presented on Figure E-12. The groundwater elevations as established for the upgradient well (MW4004C09; this well has since been abandoned) to the downgradient well (MW4004C04) were used as the hydraulic gradients to measure groundwater flow velocity at the OD/BD unit. The Darcy equation V = KI/n was used to calculate the flow rates, where V is velocity of groundwater flow (flow rate), I is the hydraulic gradient, K is the hydraulic conductivity determined from slug tests, and n is the estimated porosity of the porous medium.

$$V = \frac{\frac{K\ (h_1 - h_2)}{L}}{n}$$

Where:

- V = Actual velocity of groundwater flow
- K = Hydraulic conductivity (3.47×10^{-4} feet per minute [ft/min])
- I = ($h_1 - h_2$) = Difference in hydraulic head [MW4004C09 (936.22) and MW4004C04 (893.24)]
- L = Distance along flow path between points h_1 and h_2 (1,540 feet)
- n = Average effective porosity (15 percent)

A flow rate of 6.5×10^{-5} ft/min was calculated using the hydraulic conductivity value of 3.47×10^{-4} ft/min determined from a slug test in monitoring well MW4004C03 conducted by Law Environmental in 1989 and an estimated porosity of 15 percent.

~~Insert **Figure**~~

~~E-2 Shallow Groundwater Piezometric Map~~

~~Figure E-2. (Continued)~~

E-1a(3) Contaminant Plume Description [40 CFR 270.14(b)(c)(4)]

Refer to Section E-1a(2) for a discussion of constituent concentrations detected at the OD/BD unit to date and refer to Appendix E-2 for a figure depicting constituent concentrations through the 2010 sampling event. Background quality has not yet been established for the unit and no statistical analyses have yet to be ~~been~~ performed.

E-1a(4) Evaluation of Subsurface Geologic Formations and Surface Topography for Solution or Karst Features [401 KAR 38:090 Section 2(20)]

A discussion of the subsurface geologic formations underlying the Depot and Demo Ground area is provided in Section B-3a(2). The subsurface geology and hydrology were investigated through a series of surveys, and through evaluation of groundwater elevation measurements and sampling in 1998 and 1999, and results reported to KDEP and included in the 2004 Part B Subpart X submittal[8].

As noted in Section B-3a, a regulatory meeting was held with KDEP in February 1999. As a result of those discussions, the requirements of 401 KAR 38:090 Section 2(21) were interpreted to be met if:

- An additional upgradient well was installed and screened across the Ashlock Formation and sampling of the well supported the CSM, and
- A year's worth of groundwater and surface water data were collected and verified the conceptual model.

Contaminants were not detected in the upgradient well screened across the Drake/Ashlock Formation, which indicates at the time of sampling the Drake/Ashlock Formation contact was not a contaminant migration pathway to the north of the OD/BD unit. The sampling results supported the site conceptual model that depicted the intermediate groundwater beneath the OD/BD unit flowing to the south/southeast and discharging to the unnamed southern tributary and Muddy Creek.

Interpretation of data collected to date indicate at this time that shallow groundwater flow at the OD/BD unit is controlled predominantly by interfacial flow at the soil/bedrock interface and fractured flow. The ridge where the safety bunker is located represents the northern boundary of the OD/BD unit hydrogeologic regime. This ridge is a recharge area for the shallow and deep groundwater systems. The unnamed southern tributary that flows east into Muddy Creek represents the southern hydraulic boundary of the shallow flow system and discharge point for the shallow groundwater system at the OD/BD unit. The shallow groundwater system at the OD area flows south and southeast into the southern tributary and Muddy Creek, with Muddy Creek representing base flow for the OD/BD unit.

Groundwater and surface water data to date, along with visual observation at the time of data collection, support the original site conceptual model. The northern tributary is at a higher elevation than the southern tributary and went dry before the southern tributary during times of low flow. Groundwater and surface water data collected from June 1999 through February 2002 and reported to KDEP concurred with the proposed site conceptual model. Groundwater fluctuated due to seasonal climate changes, and indicating the southern tributary and Muddy Creek were gaining streams, with Muddy Creek representing base flow for the OD/BD unit immediate surrounding area. The groundwater and surface water data collected adjacent to the southern tributary indicated the southern tributary was a gaining stream during low flow periods and, during periods of elevated flow (flood stages), temporarily became a losing stream.

In essence, all phases of work support the conceptual hydrologic model and the requirements of 401 KAR 38:090 Section 2(21)(b) and (c)1. 401 KAR 38:090 2(21)(b) requires the owner/operator to

[8] URS Group, Inc. 2004. Subpart X of the Part B Permit Application for Blue Grass Army Depot, Richmond, Kentucky.

demonstrate that the facility is "designed" to withstand gradual or sudden land subsidence and that no contamination into or through any fractures, channels, or solution features will occur.

Extensive investigation of the site revealed that the hydrologic setting is characterized as being moderately karstified with shallow groundwater predominantly controlled by fractured flow. Bedding planes, joints, and faults control groundwater flow. A conduit flow system, characteristic of a mature karstified aquifer system, is not evident in the flow systems monitored at the OD/BD unit. Pronounced solution features were not identified during logging of the rock core samples collected during monitoring well installation, and the mature karst features were not observed during the site walkovers.

These conclusions were revisited as part of BGAD's response to Notice of Deficiency 02[9]. In 2014, a professional geologist licensed in the State of Kentucky and under contract to BGAD completed a review of aerial imagery from 2004 to 2012 and completed a visual site survey of the OD/BD unit and surrounding area on December 18, 2013. The results of these activities were documented in a Technical Memorandum submitted to KDEP[10]. The review of the imagery showed that there was very little observed changes outside of the disturbed area over the time interval evaluated (2004 to 2012). The most significant change was a removal of trees and vegetation in a wide area extending northwest from the northern side of the OD/BD unit that occurred between 2006 and 2008 photos. There were no observable changes to the site topography or drainage to suggest the development of karstic collapse features or conduit flow since 2004. The results of the visual site survey are summarized in the bullets below:

- Many low lying areas and depressions were observed to have standing water in them within the disturbed area of the OD/~~DB~~ BD unit. Flowing water was present in the drainage swale to the southwest of the OD/~~DB~~ BD unit and draining into the southern tributary to Muddy Creek near monitoring well MW4004C10. This is an indication of the low permeability, poor drainage potential for the clay residuum soils present at the site.
- Site personnel indicated that they had observed occasional water seepage from the western-most detonation pit that periodically appears when the pit is excavated close to the soil bedrock interface. Based on the description, the encountered groundwater is likely perched at the soil bedrock interface and is only observed during saturated conditions when the pit depth approaches the interface elevation.
- Four karst related features were identified and their locations surveyed with a hand held Global Positioning System unit. Two of the features has been previously identified in LTSAP Annual Reports as DP-65 and SP-75, the two other located features are not known to have been previously identified and are described below:
  - Seep SP-13-1 (GPS coordinates N 37° 40' 06.1", W 84° 12'14.8"). This feature exists as a shallow depression that was saturated and with discernibly different vegetation than the surrounding area indicating that it was frequently to continuously wet. No flowing water was observed. The depression is located at the base of a steep break in slope slightly above the floodplain level of Muddy Creek to the east-northeast of the OD/~~DB~~ BD unit. Seep SP-13-1 occurs at an elevation of about 905 feet at the mapped contact between the Drakes Formation and the upper part of the Ashlock Formation. The area around the seep was soil and vegetation covered so direct observation of the bedrock was not possible.
  - Sinkhole SH-13-1 (GPS coordinates N 37° 40' 02.0", W 84° 12' 40.3"). This feature is a small sinkhole that was located upslope and south-southeast of SP-65. The sinkhole was

[9] KDEP. 2013. *Notice of Deficiency (NOD 2) to the Subpart X of the Part B Permit Application for Blue Grass Army Depot dated 2004 and response to NOD 1 dated May 2007*.

[10] CH2M HILL. 2014. *Technical Memorandum, Open Detonation Area Karst Feature Survey*, January.

approximately 4 feet in diameter by 3 feet deep with no visible rock. It appeared to have developed recently with minimal erosion around the edges or debris in it. Based on the orientation of Sink SH-13-1 with SP-65 they do not appear to follow an alignment pattern with the surrounding surface (topographic) drainage features. While they are in close proximity, connectively between the two features is uncertain.

- Observable rock exposures were limited to the base of Muddy Creek and limited exposes on the steeper south bank of the southern tributary to Muddy Creek. No significant fracture patterns or conduit development were observed in these limited exposures.
- Based on the aerial imagery review and the visual site survey, no other potential surficial karst features were identified that would indicate karst collapse or drainage feature development since 2004.

In summary, in more than 50 years of detonations at the OD/BD unit, there is no evidence of the collapse of soluble features.

To support development of a groundwater monitoring program for the OB u~~U~~nit, as well as to evaluate potential upgradient (background) monitoring locations for the OD/BD Unit ~~area~~, an additional karst features survey was conducted within and around the OB Unit area in February 2019[11].

Digital aerial imagery of the OB unit a~~A~~rea originating between 1997 and 2018 were reviewed. The land surrounding the OB unit is highly disturbed with frequent reworking of the soil and vegetation clearing evident. There is a small area of exposed bedrock to the north of Burn Pad #2 and the access road that is visible to varying extents in the aerial photographs and was visually confirmed during the site inspection. There are some linear features associated with the bedrock outcrop area that strike east-northeast/west-southwest and north-northeast/south-southwest that may represent jointing patterns in the bedrock. But it is difficult to discern if these are natural patterns or if they are due to the heavy reworking of the ground surface in the area. ~~-~~There were very little observed changes outside of the disturbed area over the time interval evaluated. The most significant change was the addition of the building in the northwest corner of the area between 1997 and 2004. There were no observable changes to the site topography or drainage to suggest the development of karstic collapse features or conduit flow between 1997 and present.

The visual field survey was completed by walking the perimeter of the OB unit bounded by the tributaries of Muddy Creek to the north and south of the east-west ridge on which the OB and OD/BD units are located, as well as the central portions of the OB unit. Both surface water streams to the north and south representing the topographic lows were traversed within the survey area and any water found entering the surface drainages were followed upgradient until the source of the flow was located.

During the walking survey, several karst related features were identified, and their locations surveyed with a hand held Global Positioning System (GPS) unit. The located features are described below.

- Seep SP-19-1 (GPS coordinates N 37° 39.908', W 84° 12.947'). This feature exists as two separate resurgences in shallow depression that are about 10 feet apart. The area was saturated with discernible flow from the two locations with a combined flow of about 1 gpm. There was no significant channelization, suggesting that the flow is likely seasonal at best, and never a large volume. Seep SP-19-1 occurs at an elevation of about 945 ft in the Drakes Formation. The area around the seep was soil and vegetation covered so direct observation of the bedrock was not possible.

[11] Jacobs, 2019. Technical Memorandum, Open Burn Area Karst Features Survey, February 27, 2019. July

- Seep SP-19-2 (GPS coordinates N 37° 39.891', W 84° 13.031'). This is a large seep area with generally diffuse resurgence occurring at the fence line downgradient to the south of the OB unit at about 940 feet elevation. Water discharging from the area at 2 to 3 gpm, with some indications of channeling, but likely exists as a seasonal or high-water feature.

- Seep SP-19-3 (GPS coordinates N 37° 40.085', W 84° 12.985') This is a low flow volume seep located to the north of the OB unit that resurges at a break in slope within a meander bend of the surface drainage at about 940 ft elevation. The localized vegetation suggests that the location stays wet year-round. Discharge estimated at 2 gpm.

- Sinkhole/swallet SH-19-1 (GPS coordinates N 37° 39.876', W 84° 13.066'). A small (approximately 1 foot diameter and approximately 3 feet deep) open hole near the primary surface stream. Visually open conduit in the upgradient direction for at least several feet and several additional soil depressions/collapse in downgradient direction in same orientation. No active flow.

- Sinkhole SH-19-2 (GPS coordinates N 37° 40.064', W 84° 13.210'). A 16-inch diameter open hole approximately 3 feet deep with visible conduit leading downgradient. Dry.

- The surface drainage to the north of the OB unit was observed to be a gaining stream. The volume of surface water flowing in the stream was observed to be increasing downgradient (west to east) but there were no well-defined points of entry upgradient (west) of SP-19-3.

- SP-1. The feature identified as SP-1 located to the southeast of the OB unit on the historical figures was not found during this survey.

During the 2019 karst features inventory of the OB unit area, three springs/seeps were identified that could potentially be used as alternative monitoring points in accordance with 401 KAR 45:160, Section 2(2). Based on the observed conditions of the springs during the February 2019 survey, it appears that SP-19-3 likely flows year around making it a suitable alternative monitoring point. However, the other two identified discharge features appear to be seasonal or intermittent features that would not be suitable for alternative monitoring points.

Based on recommendation by KDEP, seep SP-19-3 was identified for further evaluation to potentially serve as a background location for the OD/BD and OB unit. In lieu of sampling upgradient groundwater monitoring well MW4004BO1A (which is permanently dry and/or not yielding), and with concurrence from the KDEP, seep SP-19-3 was relocated and sampled in November 2020 to evaluate feasibility to serve as a background locations. BGAD samplers did not identify SP-19-3 at the GPS locations identified in 2019 however. To distinguish between SP-19-3 located in 2019 and the seep sampled in November 2020, the original seep SP-19-3 has been retained on figures and renumbered as SP-19-3a. The seep location sampled in November 2020 was numbered SP-19-3b.

Based on the results of the 2020 sampling event and consistent with the KDEP recommendation, seep SP-19-3a is proposed for use as representative of background quality for the OD and OB units in statistical evaluations beginning in 2021.

E-1b Proposed Groundwater Monitoring Program [40 CFR 270.14(b)(c)(5)]

The OB unit is not a land treatment unit. It is an engineered structure that does not receive or contain liquid waste or waste containing free liquids; is designed to exclude liquid, precipitation, and other

run-on and run-off; and has both inner (pan) and outer (concrete pad) layers of containment. The OB unit was investigated in 1997 in accordance with a KDEP-approved plan[12] and results reported to KDEP in 1998[13]. The results are summarized in Appendix E-3. Surface soils at the OB unit were additionally sampled in 2009 prior to the installation of the concrete pads that now serve to provide a barrier between the OB pan and the underlying soils. The sampling was coordinated and attended by KDEP and results reported in a Technical Memorandum[14]. Based on the results of the 1997 sampling event, analyses were limited to SVOCs and none were detected. The concrete pads have been in place since 2009. Erosion surrounding the pads observed in 2014-2015 was repaired in 2016 and the area surrounding the pads has been graded and permanent drainage swales constructed with riprap. A downgradient sediment basin has also been installed and administrative controls are in place to ensure that the area around the pans is cleaned of ash/debris as soon as possible after heat is adequately dissipated. Surface water run-on/run-off and not vertical migration to groundwater is the predominant pathway for potential exposure from the OB unit. Nonetheless, a groundwater monitoring well network is proposed to be installed at the OB unit.

The OD/BD unit is not specifically defined as a regulated unit under 401 KAR 34:060; however, it does incorporate soil as part of its engineering design and is subject to the groundwater monitoring program requirements.

In order to evaluate the impact of OD/BD treatment operations on the uppermost aquifer, BGAD proposes to conduct groundwater monitoring pursuant to a detection monitoring program [40 CFR 270.14(b)(c)(6)] established in coordination with KDEP. Data collected under this program will determine whether hazardous constituents are present at the point of compliance at concentrations exceeding established risk-based criteria and as established by approved statistical methods. The proposed groundwater monitoring program will be revised if, upon review and statistical evaluation of the groundwater monitoring data, a compliance monitoring program is required (i.e., site-specific exceedance criteria are established).

E-1b(1) Groundwater Monitoring System [40 CFR 264.97(a), (b), and (c)] & 264.98(b)]

There are currently eight existing groundwater monitoring wells available for monitoring groundwater quality at the OD/BD unit, seven downgradient (MW4004C01, MW4004C02, MW4004C03, MW4004C04, MW4004C05, MW4004C06, MW4004C10) and one upgradient (MW4004B01A). MW4004B01A historically ~~currently~~ served~~s~~ as the background well for the hydrologic unit containing the OD/BD unit, but wa~~i~~s chronically dry and recommended to be abandoned. In lieu of sampling upgradient groundwater monitoring well MW4004BO1A, seep SP-19-3b is proposed for use in establishing background quality for the OD/BD unit beginning with the 2021 sampling event.

~~-~~The seven existing downgradient monitoring wells and SP-19-3b are recommended for inclusion in the detection monitoring program. Figure E-1 shows the monitoring well locations that currently comprise the POC monitoring well network and the location of SP-19-3b. Monitoring well logs and as-builts for the POC monitoring wells are included in Appendix E-1.

POC monitoring wells for the OB unit will be determined in coordination with KDEP and installed in accordance with a KDEP-issued compliance schedule.

~~During the 2019 karst features inventory of the OB unit area, three springs/seeps were identified that could potentially be used as alternative monitoring points in accordance with 401 KAR 45:160, Section 2(2). Based on the observed conditions of the springs during the February 2019 survey, it appears that~~

[12] Radian International. 1997. *Sampling and Analysis Plan for Soil Site Characterization of the OB/OD Units at Blue Grass Army Depot*, October.

[13] Radian International. *Soils Site Characterization Report for the OB/OD Units at Blue Grass Army Depot, Richmond, Kentucky*, September.

[14] CH2M HILL. 2009. *Technical Memorandum, Soil Sampling at Open Burning (OB) Unit*, July.

~~SP-19-3 likely flows year around making it a suitable alternative monitoring point. However, the other two identified discharge features appear to be seasonal or intermittent features that would not be suitable for alternative monitoring points.~~

Based on the location of the burn pans within the local topography it is anticipated that shallow groundwater flow will be predominantly to the south with a lesser component of flow to the north. Because the burn pans are located near the top of an east-west trending ridge and historical background monitoring locations were unsuccessful, additional assessment was necessary to identify a suitable background location. Based on the results of the 2020 sampling event and consistent with the KDEP recommendation, seep SP-19-3a is proposed for use as representative of background quality for the ~~OD/~~OB unit in future statistical~~there is no suitable location for the installation of the monitoring well that can be considered upgradient to serve as a background monitoring point~~. A discussion of background conditions and statistical evaluations of the monitoring program data is in Sections E-1b(5) and E-1b(6).

Three downgradient monitoring points are proposed for the OB unit monitoring network as shown on Figure E-2~~1a~~. ~~Seep~~spring SP-19-~~3~~3a will serve as the upgradient~~a~~ groundwater sampling point ~~to address the potential northern component of groundwater flow originating from the OB Unit~~. The southern component of groundwater flow will be monitored by two monitoring wells to be installed south of the OB unit. The two wells will be preferentially located in proximity to the groundwater seeps, SP-19-1 and SP-19-2, observed in the February 2019 karst features inventory. The presence of discharging groundwater at these locations is indicative of the presence of a preferential pathway in these areas. Monitoring wells will be installed at suitable and accessible locations near the seeps. Depending on bedrock conditions and groundwater encountered during borehole installation, the wells will be screened either at the soil bedrock interface or at the contact between the Drakes Formation and Ashlock Formation that occurs at about 905 feet elevation.

E-1b(2) Sampling and Analysis Procedures [40 CFR 264.97(d)]

The following procedures are proposed to be implemented to collect groundwater samples in support of the proposed detection monitoring program. Upon permit issuance, it is anticipated that a permit monitoring plan will be developed in coordination with KDEP to describe the sampling and analysis procedures.

E-1b(2)(a) Sample Collection

Groundwater will be purged and groundwater samples will be collected from each monitoring well using a submersible pump in accordance with the low-flow protocols as described in *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures EPA/540/S-95/504* (EPA 1996) to the extent possible. Use of this method will help minimize sample turbidity. Purging and sampling will be completed using a peristaltic pump, bladder pump, or other downhole submersible pump capable of achieving the low-flow discharge target range of 0.1 to 0.5 liter per minute. The pumps will be affixed with new, disposable tubing for each well. Field parameters for pH, temperature, specific conductance, turbidity, oxidation-reduction potential, and dissolved oxygen will be measured during the purging process with a water quality meter calibrated per manufacturer's recommendations. The water level in the well also will be monitored throughout the purging process to determine that the minimal drawdown criteria are met. If the water level declines more than 0.2 foot, the discharge rate should be reduced.

Monitor wells should be purged until the field parameters have stabilized within the ranges specified below and the water level is stable. The field parameter stabilization criteria are as follows:

Table E-1. Field Parameter Stabilization Criteria

Field Parameter	Stabilization Criterion
Water Levels	Total drawdown of <2 ft and an appreciable drawdown of no more than 0.33 ft

Table E-1. Field Parameter Stabilization Criteria

Field Parameter	Stabilization Criterion
DO	0.10 mg/L or 10% of value (whichever is greater)
Specific Conductance	+/- 3% Full Scale Range
pH	+/- 0.10 pH unit
Temp	+/- 0.2 Deg. C
Turbidity	+/- 10% (<10 NTU)
Oxidation Reduction Potential (ORP)	+/- 10 mV

Field parameters will be documented on a field sampling log sheet.

In the event that stabilization criteria cannot be achieved, the conventional "three-well-volume" purging method may be used. The following equations should be used to calculate threewell volumes:

$$Vw = (H \times 0.163) \times 3 \text{ (for 2-inch wells)}$$

$$Vw = (H \times 0.653) \times 3 \text{ (for 4-inch wells)}$$

Where: *Vw* is the volume of water to be removed from the well in gallons and *H* is the height of the water column in feet. This formula takes all conversions into consideration. Wells will be purged for a minimum of three well volumes and until the parameters of temperature, pH, and specific conductance have stabilized.

For certain wells in the complex, groundwater yield is so low that the low-flow and the conventional three-well-volume methods are rendered impractical. For these wells, the most practical sampling method is to purge the well dry and collect a groundwater sample as soon as a sufficient volume of water has recharged into the well and within 24 hours of being purged dry. Groundwater samples will be collected in the order of the parameters' volatilization sensitivity (greatest to least).

If the three-well-volume method is used, purging may be accomplished using a pump or disposable or stainless steel bailers. Clean nylon rope will be used to haul bailers and will be discarded after well sampling is complete. When the pump is used, clean poly tubing will be used at each sampling location. The pump is controlled such that discharge rates do not exceed 1 gallon per minute during purging. The pump will be decontaminated between sample locations and tubing will be discarded.

At locations sampled using bailers, sample bottles will be filled by pouring water from the bailer top at a slow rate to minimize turbulence. At locations sampled using a pump, a flow rate of 500 milliliters per minute or less will be maintained during sample collection. Bottles will be filled directly from the pump discharge tube. Once filled, the sample bottles will be capped, labeled, placed on ice, and chain of custody records completed.

Sampling of seeps~~springs~~ will be completed by filling the laboratory provided bottles directly from the spring discharge if there is sufficient clearance for the bottles to fill. Alternatively, a separate, decontaminated container or pitcher will be used to capture the water and pour into the laboratory provided bottle ware.

Duplicate and split samples will be collected from at least 10 percent of the sample locations and field matrix spike/matrix spike duplicate samples will be collected from at least 5 percent of the sample locations.

E-1b(2)(b) Sample Preservation and Handling

Groundwater samples will be collected in appropriate sample containers, properly preserved, sealed, and labeled. Table E-2 presents sample containers, preservation methods, and holding times. Each

sample container will be identified by affixing a pressure-sensitive, gummed label. This label will contain the sample identification number, date and time of collection, source preservative used, analysis required, and the collector's initials. All samples will be recorded on a chain of custody record (see Figure E-3).

Standard chain of custody procedures will be followed to track possession of the samples from sample collection until analysis. A sample will be considered under custody if it is (1) in the possession of the sampling team, (2) in view of the sampling team, or (3) transferred to a secure area. An area is considered secure only when it is locked and access is controlled.

Table E-2. Sample Analyses, Containers, Preservation and Holding Times

Analyses	Sample Matrix	Container	Preservative	Holding Time
Explosives	W S	1-L amber glass 8-oz glass	Cool 4°C Cool 4°C	7/40 days 14/40 days
Metals (Total with Mercury)	W S	250-mL polyethylene 4-oz glass	HNO3, pH < 2 Cool 4°C Cool 4°C	Mercury: 28 days Other metals: 6 months Mercury: 28 days Other metals: 6 months
Metals (Dissolved with Mercury)	W	250-mL polyethylene	Cool 4°C	Mercury: 28 days Other metals: 6 months
Perchlorate	W	250-mL polyethylene	Cool 4°C	28 days

Notes:
°C = degrees Celsius
L = liter
mL = milliliter
S = Sediment and Surface Soil
W = Water

The field supervisor is responsible for custody of the collected samples in the field until they have been properly packaged, documented, and transferred to a courier or directly to the laboratory. If samples are not immediately transported to the analytical laboratory, they will remain in the custody of the field supervisor. A chain of custody record will be used for all samples collected under the compliance monitoring program. A sample chain of custody record form is shown in Figure E-3. The laboratory will follow its own internal chain of custody procedures.

Legend

- Identified Feature
- Proposed Monitoring Well
- Open Burning Unit
- Expected Groundwater Flow Direction

N

0 250 500

Feet

Figure E-2
Groundwater Monitoring Network
Open Burning Unit
Blue Grass Army Depot
Richmond, Kentucky

JACOBS

C:\USERS\ZANDERSO\DOCUMENTS\GIS\BGAD\FIGUREE-2_PROPOSEDGWMN.MXD ZANDERSO 7/15/2019 2:55:49 PM

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SAMPLE CHAIN OF CUSTODY

Laboratory **NAME**
Address **ADDRESS 1**
ADDRESS 2
Phone **(AC) Number**

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Page ___ of ____ Pages

Project No.			**Required Analysis**										____Standard Report Delivery
Project Name and Location													____ Expedited Report Delivery
Client Name	Client Manager												
Client Address (City, State, Zip)													Date due
Sample		**Sample Identification**	**Matrix Type**	**Number of Containers Submitted**									**Remarks**
Date	**Time**												

Relinquished by: (signature)	Date	Time	Relinquished by: (signature)	Date	Time	Relinquished by: (signature)	Date	Time
Received by: (signature)	Date	Time	Received by: (signature)	Date	Time	Received by: (signature)	Date	Time

Laboratory Use Only

Received by: (signature)	Date	Time	Custody Intact YES ____ NO ____	Custody Seal No.	SL Log No.	Laboratory Remarks

Figure E-3. Sample Chain of Custody Form – Typical Format

Sample identifiers will identify the media sampled, the monitoring well number, the sample number, and date. An example identifier is “GWMW11080197” (groundwater sample from monitoring well 1, sample 1, collected August 1, 1997).

Sample labels will be affixed to all sample containers prior to or at the time of sampling. Sample seals will be used to detect tampering of samples prior to analysis. The seal will be attached in such a way that it is necessary to break the seal in order to open the sample container. As an alternative to using sample seals, evidence tape with the collector's initials and date may be used. Labels will be completed with black indelible ink and, at a minimum, will contain the sample identifier, date, time, sampler’s initials, analysis to be conducted, preservative, site name, and type of sample.

At the end of each sampling day, samples requiring shipment will be repackaged in shipping containers with double-bagged wet ice as specified by the laboratory and analytical protocols. The samples will be packaged to prevent leakage and breakage during shipping. Each shipping container will be sealed with a custody seal and sent to the laboratory by an overnight delivery service.

E-1b(3) Analytical Procedures and Frequency [40 CFR 264.97(e) & 268.98(a), (c) and (d)]

Hazardous constituents are constituents identified in 401 KAR 31:170 (which references 40 CFR 261 Appendix VIII) that have been detected in the groundwater in the uppermost aquifer underlying a regulated unit and that are reasonably expected to be in, or otherwise likely to be derived from, wastes treated at the facility or other materials that were used. Groundwater monitoring efforts to date have not included sampling for all 401 KAR 31:170 analytes or those found in 401 KAR 34:360 (which references 40 CFR 264 Appendix IX), which are used specifically for groundwater monitoring purposes.

The list of proposed hazardous constituents for the detection monitoring program was developed based on:

- Knowledge of past treatment operations
- Types, quantities, and concentrations of constituents likely to be present in the wastes treated
- Constituents previously detected in the groundwater
- Potential for adverse impact to human health and the environment

Groundwater samples will be properly packaged and shipped to Kentucky-certified analytical laboratories. Analyses will be performed in accordance with EPA Method SW-846, latest version. Table E-2 presents the proposed analyses for the detection monitoring program.

Samples will be collected in the following order:

1. Metals (total and dissolved)
2. Perchlorate
3. Explosives

~~Perchlorate is proposed to be sampled for a total of four sampling events (beginning with the 2015 event at the OD/BD unit). If results indicate no detections above screening criteria, perchlorate sampling is proposed to be discontinued unless indicated by a change in the BGAD OD waste stream.~~ Dissolved metals analyses will only be performed on analytes detected above their respective MCL during the associated total metals analyses. Groundwater samples collected for dissolved metals analyses will be filtered by the receiving laboratory.

Semi-annual sampling will be instituted at the OB and OD/BD units to assess seasonal fluctuations. BGAD may petition KDEP to move from semi-annual to annual sampling after sufficient data have been collected to show minimal variation in the data between seasons and justify reduced monitoring. BGAD may additionally petition KDEP to remove specific analytes if consistent trend analysis shows these are not detected or detected only below groundwater protection standards.

E-1b(4) Determination of the Groundwater Surface Elevation [40 CFR 264.97(f)]

Prior to each groundwater sampling event, the groundwater surface elevation in each well will be measured with a clean, electric water level indicator from a reference point at the top of the PVC casing. Water levels will be recorded to the nearest 0.01 foot.

E-1b(5) Procedures for Establishing Background [40 CFR 264.97(g)]

Background groundwater quality has not yet been established for the proposed monitored parameters. Originally, monitoring well MW4004B01A was installed upgradient of the OD/BD unit to serve as a background monitoring location. However, because of its position on the topographic high point of a narrow ridge, the stormwater catchment area for the well is very small; consequently, the well is frequently dry. As a potential alternative background monitoring location, a spring, SP-65, located downslope on the opposite (north) side of the ridge from the OD/BD unit, has been sampled to assess its potential to serve as an alternative for background monitoring. However, several site-specific COCs have been detected in SP-65 suggesting it is not representative of background conditions. In addition to the OD/BD unit, there are multiple potential sources for the detections observed in SP-65, including the Former Mustard Trenches (SWMU 002), the Pink Water Pond Area (SWMU 003), and the Waste Ammo Detonation Area and Propellent Burn Area (SWMU 007). Based on the site topography and the Conceptual Hydrologic Model for the OD/BD unit, it is unlikely that the detected compounds in SP-65 originate from the OD/BD unit, but the possibility of transport to SP-65 through the shallow epikarst zone cannot be eliminated. Seep SP-65 will be removed from the groundwater monitoring network beginning 2021.

A karst feature survey was conducted in February 2019 to the west and northwest of the OD/BD unit and encompassed the OB unit area in an attempt to locate additional springs that may serve as background monitoring locations. K~~The survey did not locate any suitable springs. Alternatively, k~~nown spring, SP-64, located west of SP-65 and further away from the potential inputs from the OD/BD unit, was sampled in February 2019. The analytical results indicted the presence of several site COCs in the groundwater emitted from that spring, suggesting that it also is not representative of background conditions.

Based on additional assessment performed in 2020 consistent with ~~the~~ KDEP recommendation, a suitable background quality location (i.e., SP-19-3b) was identified. ~~Because of the location of the OD Unit on the side slope of a narrow ridgeline, the high secondary porosity of the fractured limestone bedrock, and the presence of OD Unit COCs in the springs located on the opposite side of the topographic high divide, there is no viable spring or location available to install an alternative background well that will be capable of representing upgradient or background groundwater conditions.~~ B~~Therefore, b~~ackground groundwater conditions will be evaluated on an inter~~a~~well basis using the statistical procedures specified in E-1b(6).

E-1b(6) Statistical Procedures [40 CFR 264.97(h) & 264.98(f)]

Statistical analysis of the analytical results from each monitoring event will be performed in accordance with 40 CFR 264.97(h) and 264.98(f). Due to historical issues associated with identifying an appropriate background monitoring location, statistical analyses could not be performed. Additional assessment and sampling was performed in 2020 consistent with KDEP recommendation and resulted in the identification of a suitable background quality location (i.e., SP-19-3b). Beginning in 2021,~~While the use of~~ interwell statistics (comparison of upgradient to downgradient wells) for naturally occurring compounds will be applied to monitoring data performed in accordance with 40 CFR 264.97(h) and 264.98(f). It is noted that ~~is typically preferred, the assumptions built into these statistical approaches assume that they are being applied in a homogeneous aquifer in which the distribution of the constituents within the aquifer are uniform. This assumption is not well suited for the hydrogeologic conditions (karstic flow) and frequent disturbances associated with the OD unit that result in a high potential for spatial variability. As stated in the EPA Unified Guidance for Statistical Analysis of~~

~~Groundwater Monitoring Data at RCRA Facilities (EPA, 2009), "*When the population mean levels vary across a well field, there is little likelihood that the upgradient background will provide an appropriate comparison by which to judge any given compliance well. Evidence of spatial variation should drive the selection of an intrawell statistical approach…*"~~

~~Furthermore, because an appropriate upgradient, or background, sampling location has not been identified for the OD Unit, interwell statistical procedures are not appropriate for evaluation of the available dataset. t~~The primary site CO<u>P</u>Cs, including ~~HMX and RDX (~~explosives<u>, perchlorate, VOCs, and SVOCs</u>~~)~~, are not naturally occurring compounds that require the establishment of background concentrations. ~~Therefore, an intrawell statistical approach will be applied to the data in accordance with 40 CFR 264.97(i)(2).~~ The historical data from the individual wells will be used to established background concentrations for each well that can then be compared to the current results to determine if there has been a statistically significant increase (SSI) in the individual parameters within each well.

As discussed in the EPA Unified Guidance, spatial variability between wells due to existing onsite conditions can result in mean differences in concentrations that can be identified by ANOVA, but the cause of these differences cannot. Therefore, a statistically significant ANOVA result may be falsely attributed as a release from the regulated unit due to the assumptions built into the method when the result is actually the consequence of natural variability. Because of this, the Unified Guidance does not recommend the use of ANOVA for formal detection monitoring at sites with high potential for spatial variability.

In accordance with 40 CFR 264.97(h) (3), the use of the tolerance limit (TL) statistical methodology was selected as a more appropriate and representative procedure to evaluate the OD and OB units groundwater monitoring network data. The use of <u>a</u> parametric or non-parametric method will vary by the individual parameter data being evaluated. Specifically, <u>n</u>~~N~~on-parametric methods are designed to evaluate datasets with a high percentage of non-detect data, while parametric methods are designed to evaluate datasets with a high percentage of detections. Following the statistical procedures outlined in the Unified Guidance, upper TLs will be established for each detected parameter based on a 95% coverage coefficient and a 95% confidence level. If determined necessary, the data will be normalized to account for any temporal (seasonal) variability.

For each monitoring event, the TLs will be calculated by incorporating the available historical analytical data from the preceding monitoring events into the dataset used to establish the TLs based on a 95% coverage coefficient and a 95% confidence level (per Table 17-3 of the Unified Guidance). If there are insufficient detections of an individual parameter to calculate the TL then, as specified in the Unified Guidance, the laboratory reporting limit (RL) may serve as the TL. The current concentration of the individual parameters will be compared to the derived TLs for each individual well. If the current concentration exceeds the calculated upper TLs, then it will be considered a<u>n statistically significant increase (</u>SSI<u>)</u> relative to the historical data for that individual parameter in that well. If an SSI is identified, then the processes outlined in E-1d will be implemented.

Should ongoing sampling indicate that an alternate statistical method not identified in 40 CFR 264.97 (h) is more appropriate for the site, BGAD will submit a written request to KDEP justifying the alternate method.

E-1b(7) Groundwater Flow Direction and Rate [40 CFR 264.98(e)]

Groundwater flow rate and direction will be determined annually by assessing groundwater elevation data collected during sampling events.

E-1b(8) Recordkeeping and Reporting [40 CFR 264.97]

Groundwater monitoring data will be used to prepare monitoring reports to be submitted to KDEP no later than 90 days after the sampling event and will summarize the groundwater data and determinations made pursuant to the permit and 40 CFR 264.98(f) and (h). Analytical results will be tabulated and compared against the most current groundwater protection standards established by the permit~~permitted concentration or MCL. In the absence of a permitted concentration limit or MCL, the most current RSL for tap water will be used~~. The monitoring reports and supporting data will be maintained in the BGAD operating record.

E-1c Detection Monitoring Program [40 CFR 264.98]

As previously described, BGAD has proposed to enter into a detection monitoring program. The purpose of the detection monitoring program is to monitor groundwater at the OB and OD/~~DB~~BD unit to ensure that the units continue to operate in a manner that poses no unacceptable level of risk to human health or the environment. The proposed data quality objectives (DQOs) for the detection monitoring program were established based upon EPA Guidance[15], and serve as the basis for its design. The DQOs identify the type, quality, and quantity of data to be collected and how the data are to be used to make appropriate decisions with respect to the permit.

The DQOs were developed through a seven-step process used to establish the final data collection design. The first five steps of the process identify mostly qualitative criteria, such as what problem has initiated the monitoring (i.e., ensure the unit is operated in a manner that poses no unacceptable level of risk to human health or the environment) and what decision is needed to resolve it (i.e., determine whether contaminants generated from OB and OD/~~DB~~BD operations are present at levels that exceed acceptable risk criteria). These steps also define the type of data to be collected, where and when the data will be collected, and a decision rule that defines how the decision will be made. The sixth step defines quantitative criteria, expressed as limits on decision errors that can be tolerated by the decision-maker. Decision errors are minimized by ensuring quality measures and controls throughout groundwater monitoring well installation, sampling, and analysis. The final step is the development of the data collection design using the criteria developed in the previous six steps. The final output of the process is the data collection design that meets the qualitative and quantitative needs of the project. The following proposed DQOs have been identified:

- Monitor the levels of constituents of potential concern in the point of compliance monitoring network through a systematic and routine sampling regime.
- ~~Define the level and extent of identified contaminants of concern (COCs, i.e., those contaminants of potential concern [COPCs] that exceed concentration limits).~~
- Compare groundwater analytical results with groundwater protection standards ~~MCLs or current RSLs (formerly called EPA preliminary remediation goals [PRGs]) for tap water (in the absence of MCLs) or~~ as established by KDEP in the current~~final~~ operating permit.
- Define the level and extent of identified contaminants of concern (COCs, i.e., those COPCs that exceed concentration limits).
- ~~~~
- Complete a statistical analysis of the results of naturally occurring compounds~~metals analysis~~ within the POC and background ~~well~~ network in accordance with 40 CFR 264.97(h).

[15] U.S. Environmental Protection Agency (EPA). 2000. *Guidance for the Data Quality Objectives Process*, EPA QA/G-4. August.

- Compare current results to historical data to determine if there has been a SSI in the individual parameters within each well.

E-1d Compliance Monitoring Program [40 CFR 264.99]

In the event that statistical analysis of the groundwater monitoring data during the detection monitoring period shows that an SSI ~~statistically significant increase~~ has occurred at the point of compliance suggesting that a release may have occurred from the unit, BGAD will notify KDEP in writing. BGAD then has the opportunity to submit a demonstration that a source other than the regulated unit caused the statistically significant change in groundwater quality, or that the apparent groundwater degradation is the result of an error in groundwater sampling, analyses, or evaluation. If the demonstration is successful, then BGAD will submit an application to make appropriate changes in the detection monitoring program, as necessary. BGAD will continue to monitor groundwater quality in accordance with the conditions of its permit and this application until the modification is approved.

Should the presence of a release from the OB or OD/BD unit be confirmed, BGAD will abide by the requirements of 40 CFR 264.98 by immediately sampling the groundwater in all monitoring wells and determine whether constituents in the list of Appendix IX of Part 264 (or subset thereof, as agreed to by KDEP) are present, and if so, at what concentration. BGAD will work in coordination with KDEP to establish a compliance monitoring program consistent with 40 CFR 264.99.

E-1e Corrective Action Program [40 CFR 264.100]

Upon confirmation of a release from the OB or OD/OB~~D~~ unit beyond the established point of compliance at concentrations above concentration limits and as determined through approved statistical analysis procedures, BGAD will establish a corrective action program in coordination with KDEP.

E-2 Environmental Performance Standards Demonstration [401 KAR 34:250 & 40 CFR 264.601]

This section addresses the Environmental Performance Standards demonstration for prevention of releases that may have adverse effects on human health or the environment due to migration of waste constituents to the surface, subsurface, groundwater, surface water, and wetlands. The Environmental Performance Standards for prevention of releases that may have adverse effects on human health or the environment due to migration of waste constituents in air are addressed in the air modeling and risk assessment report that accompanies this application.

E-2a Surface and Subsurface Soils

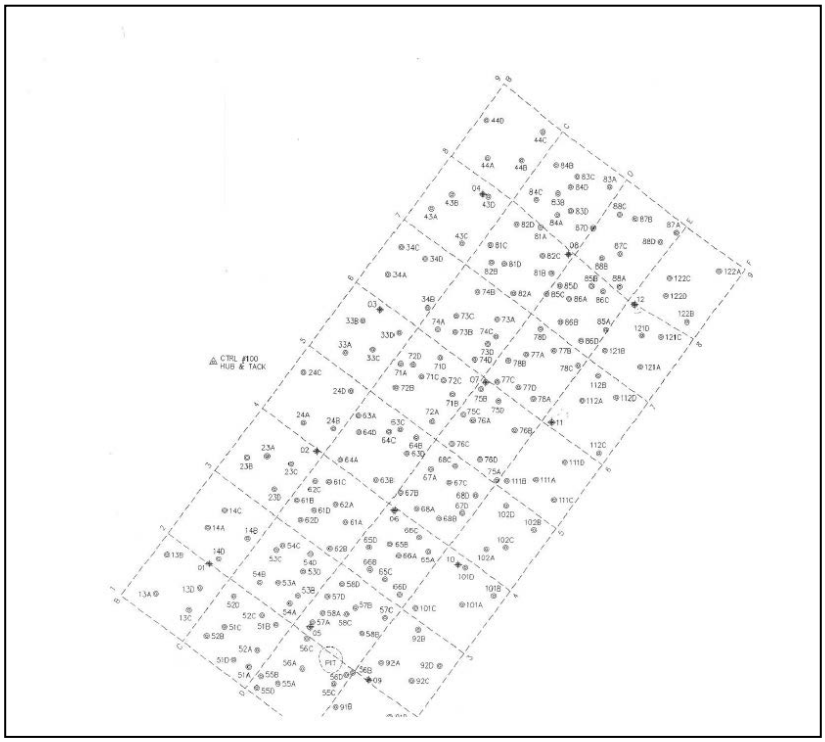
Soils within the OB and OD/~~DB~~BD unit were characterized as part of a baseline comprehensive site characterization in 1998. The sampling plan and implementation were coordinated with KDEP and results reported in the Soils Site Characterization Report[16]. The results are additionally summarized in Appendix E-3. Identified COPCs for the study included explosives, metals, SOVCs, and cyanide. VOCs were not selected as COPCs because of the high potential for volatilization at the OD/~~DB~~BD unit and absence of the use of fuel oils at the OB unit. The intended sampling protocol included a single subsurface sample for geotechnical analysis from the OB unit and two from the OD/~~DB~~BD unit. However, repeated subsurface borings within the OD/BD unit failed to identify an undisturbed layer of

[16] Radian International. 1998. *Soils Site Characterization Report for the OB/OD Units at Blue Grass Army Depot, Richmond, Kentucky*. September.

soil. The OD/~~DB~~BD unit was found to consist of a disturbed layer of a mixture of natural soils and fill ranging from a depth of 0.5 foot to 10 feet, underlain by a bedrock shelf. The field team concluded that geotechnical analysis of the disturbed soils had little value because of the introduction of fill material from varying origins to the OD/~~DB~~BD unit. Therefore, Geotechnical analysis was limited to a single sample collected approximately 30 feet southwest of Burn Pan 2.

At the OB unit, surface soil samples were collected and composited from a series of concentric circles surrounding the pans at a distance of 1 foot, 5 feet, 10 feet, and 25 feet. Each composited sample consisted of four discrete samples collected from each of the four sides of the pan. The samples were composited by ring to identify contaminant concentration trends that may occur as a result of kickout and ash/residue deposition around the pans. One subsurface soil boring was also completed at a distance of approximately 30 feet downgradient from each of the two pans. Eight surface soil and two subsurface soil samples were submitted for analysis for SVOCs, metals, explosives, and cyanide. Sampling was completed within 24 hours following an OB event.

At the OD/~~DB~~BD unit, the sampled area was defined by a 400-foot by 800-foot sampling grid (shown in the inset) centered on the centerline of the most recent line of pits. Each grid measured approximately 100 feet by 100 feet. The sampling grid and sampling points were surveyed for horizontal control by a state-licensed survey company. Surface soils were composited within each grid. Each composited sample consisted of four discrete samples taken from random locations within each grid. One composited surface soil sample was additionally collected from each of the outlying grids (farthest from the line of pits), while two composited surface soil samples were collected from each of the inner grids (grids containing the pits). The samples were composited to determine an estimate of the mean concentration of COPCs across the active treatment area of the OD/~~DB~~BD unit. A total of 48 surface and 11 subsurface samples were submitted for analysis for SVOCs, metals, explosives, and cyanide. In addition to these, pre- and post-treatment samples were also collected from clean fill material within a single pit as part of a field test. The field test was conducted to verify the effectiveness of the OD/BD treatment process in eliminating the reactive characteristic of the waste. Samples were submitted for explosives analysis only.



A background soil sampling location was selected based on similar soil types (as represented by the USGS geological map) as those naturally occurring in the OB and OD/~~DB~~BD units and isolation from known current and historical industrial activities. Four discrete surface and two subsurface soil samples were collected from the background location.

In addition to these, two sediment samples were taken from within surface water drainage channels on the downgradient slope of the OD/BD unit. One sample was taken at the point of sediment deposition (identified by visual inspection) of each of the drainage channels. The two sediment samples were

submitted for SVOC, metals, explosives, and cyanide analyses. A single grab surface water sample also was collected from a pond that was previously located within the OD/~~DB~~BD unit and submitted for the same analyses. The pond was later drained and filled.

By recommendation of KDEP, screening levels at the time were those published in the Human Health Generic Screening Levels (HHGSL) table from the former 401 KAR 100:050 Risk Assessment Guidance. The sample results reported for the 1998 baseline characterization study were excerpted from the report and are presented in Appendix E-3. The data have additionally been related to the current EPA RSLs.

The data collected during the baseline site characterization effort showed that the greater than 50 years of DoD operations in and in the vicinity of the OB and OD/~~DB~~BD units have contributed to increased levels of some hazardous constituents in the soils beneath the active units.

A soil sampling protocol to assess current concentrations within soil media at the OB and OD/BD units will be developed in coordination with KDEP and implemented in accordance with a KDEP-issued compliance schedule. Geotechnical analysis for particle size distribution for OD/BD unit soils will be included as directed by KDEP.

E-2b Surface Water and Sediments

Initial surface water and sediment sampling was completed by Radian International in June 1999. The scope of the sampling effort was to identify contamination within Muddy Creek, the southern tributary, and two seeps located within the northern tributary and the western drainage channel. Sampling was conducted in accordance with a KDEP-approved Work Plan[17]. Both upgradient and downgradient sediment and surface water sampling was performed within the tributary and creek. Sampling results are provided in Appendix E-3.

In 2002, Environmental Chemical Corporation completed a surface cleanup of munitions related debris within Muddy Creek adjacent to the OD/~~DB~~BD unit and a report issued. The summary report was not located in preparation of this permit application but the laboratory report was reviewed. The results were not decipherable to a great degree in the absence of narrative. In general, the results show that a small number of upgradient and downgradient (of the work effort) surface water and sediment samples collected from within Muddy Creek during the cleanup were submitted for explosives and metals analysis and results show detections of both. Similar to other results, arsenic and lead in sediment appear elevated in both upgradient and downgradient sampling locations. Low concentrations of explosives (2,4,6-Trinitrotoluene, 4-Amino-2,6-Dinitrotoluene, HMX, and RDX) were detected in downgradient surface waters.

Additional soil/sediment grab samples were collected within the bounds of the OD/~~DB~~BD unit by BGAD in 2006. Three grab samples were collected from within a drainage channel that had formed within the eastern boundary of the treatment area and two grab samples were collected from a drainage channel that had formed within the western boundary of the treatment area. All samples were analyzed for the explosives 2,4,6-Trinitrotoluene, HMX and RDX, SVOCs, metals, and perchlorates. The samples were collected for general information and not as part of a sampling program or approved protocol, and data validation was not completed. There were no detections of explosives or perchlorates in any sample and only a single SVOC (1,2-Dichlorobenzene) was detected at 0.57 milligrams per kilogram (mg/kg) at one location within the western drainage channel. Metals were detected consistently at all locations. Comparison to residential and industrial RSLs indicates elevated levels of aluminum, arsenic, cobalt, iron, lead, and manganese at some grab sample locations.

[17] Radian International. 1998. *Work Plan for Monitoring Well Installation and Groundwater, Surface Water and Sediment Sampling Activities at the Open Detonation Area*. October.

BGAD operates under a Kentucky Pollutant Discharge Elimination System (KPDES) permit issued by the Surface Water Permits Branch of KDEP. Ten outfall locations are identified in the permit. Outfalls 8 and 9 are associated with the point source discharges from the OB unit sediment control basins. These outfalls are required to be sampled monthly and analyzed for iron, lead, total suspended solids, hardness, and pH. One outfall, Outfall 5, is located downgradient of OB and OD/BD operations at the location where Muddy Creek exits the Depot along the northeast installation boundary. No monitoring of this outfall location is required by the KPDES permit. The KPDES additionally requires implementation of best management practices (BMPs) that prevent or minimize the potential for the release of pollutants from ancillary activities through site runoff; spillage or leaks, sludge or waste disposal, or drainage from raw material. The significant upgrades to the OB unit, inclusive of site grading, drainage swales, riprap, and sediment control basin, are included in the Depot's BMPs and intended to mitigate surface water run-off and provide protection of nearby surface water (unnamed tributary of Muddy Creek) and its sediment. Therefore, no additional monitoring or controls are proposed for the OB unit.

Previous sampling results indicate that the sediment and potentially the surface water within the unnamed southern tributary of Muddy Creek and Muddy Creek itself are impacted by contaminants and/or naturally occurring constituents. The results indicate that both upgradient and downgradient locations of the OD/BD unit may be impacted. It is not known whether the impact is a result of historical operations or whether current operations are contributing.

A sediment sampling protocol to assess the impact of sediment runoff from the OD/BD unit will be developed in coordination with KDEP and implemented in accordance with a KDEP-issued compliance schedule.

Effective sediment control measures (i.e., riprap barriers) have been in place for approximately a decade. These controls mitigate the potential for contaminant runoff. Historical photography shows the improvement in the control of erosion and sediment runoff from the site. During the conduct of soils site characterization in November 1997, two distinct drainage channels were noted along the eastern and western ends of the line of pits. Hay bales were installed as a temporary measure to mitigate sediment run-off until the permanent riprap barriers were installed. The effectiveness of these barriers is evident today. The southern portion of the OD/BD unit has filled in with sediment and vegetation growth is considerable. BGAD maintains the unit with a combination of grading to divert surface water from the line of pits/detonation area and maintenance of the riprap barriers. No additional engineering controls are recommended.

E-2c Groundwater

Groundwater is addressed in Section E-1. A program of groundwater monitoring is recommended in Section E-1 to detect and evaluate potential COPCs that may be migrating to the groundwater beneath the OB and OD/BD unit.

E-2d Wetlands

Wetlands are addressed in Part J of this application. Wetlands mapped on BGAD are shown on Figure J-1 of Part J of this permit application. Wetlands are not located proximate to the OB or OD/BD units and will not be impacted by their operation.

E-3 Corrective Action for SWMUs and AOCs [401 KAR 34:060 Section 12]

Under the Defense Environmental Restoration Program (DERP) established by Congress in Title 10 United States Code 2701-2702 and 2810, all DoD installations are required to clean up sites posing a

threat to human health and safety. The DERP provides for centralized management of the cleanup of DoD hazardous waste sites consistent with the provision of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR §300) and Executive Order 12580, Superfund Implementation. The DERP also provides for limited activities to reduce the amount of hazardous waste generated and disposed of.

Policy requires installations to take immediate action to eliminate human exposure to contamination and remove imminent threats to health. This is to be accomplished by development of partnerships with EPA, state, and local regulatory agencies by identifying points of contact, consulting with them early and throughout the Installation Restoration Program process, soliciting their comments as appropriate on plans and reports, and engaging them in joint reviews of requirements and available resources. Defense and State Memoranda of Agreement will be signed by the Deputy Under Secretary of Defense Environmental Security with interested states and territories to expedite cleanup and to reimburse them for technical support services at National Priorities List (NPL) and non-NPL sites.

Installation Restoration activities shall be carried out subject to and in a manner consistent with the requirements of the RCRA for corrective action under sections 3004(u), (v) and 3008(h) will be followed where appropriate.

BGAD has SWMUs and Areas of Concerns (AOCs) for which groundwater monitoring activities occur unrelated to this permit renewal application. The status of the SWMUs and AOCs is provided below for reference only.

Groundwater monitoring data for wells at BGAD during interim status are referenced in the following reports for convenience:

- RFI, Draft Final Report of the Pink Water Pond Area, Law Engineering and Environmental Services, Inc. (Law) 1989
- Final Report, RFI of the Propellant Burn Area, Law 1989
- RFI, Final Report of the Mustard Trench Area, Law 1989
- RFI, Final Report of the Open Detonation Area, Law 1989
- RFI, Final Report of the Dry Acid Pond Area, Law 1989 and RFI Phase II, Sverdrup Environmental, Inc. (SVE) 1994
- RFA, Final Report of the Fire Training Area, Law 1989
- RFI, Final Report of the New Landfill Area, Law 1989
- RFI, Final Report of the TNT Lagoon Area, Law 1989 and RFI Phase II, SVE 1996
- RFI, Final Report of the Propellant Burn Area, Law 1989
- RFI, Final Report of the Old Landfill Area, Law 1989 and Phase II, SVE 1996
- LTM, Quarterly Monitoring Reports, IT Corp. (IT) 1998/1999
- Dry Acid Pond, Final Report, Sang Corp., 1998
- Final Groundwater Sampling at the Open Detonation Area, SVE 1996
- BGAD Fire Training Area Sampling and Analysis Report, Ogden 1994
- Final Sampling Report, Soil Sampling DRMO Stockpile Area, BGAD, Richmond, Kentucky, SVE 1994
- Final Report, Interim Remedial Action Plan Study (Groundwater) for New Landfill, SVE 1994

- Final Report, Interim Remedial Action Plan Study (Groundwater) for Old Landfill, SVE 1994
- Final SI Report, Combined Sites, Vols. I, II and III, SVE 1996
- Final Report Battery Burial Area, SVE 1995
- Final Report for SI, at Additional SWMUs Group B Vols. I – VII, SVE 1995
- Remedial Design Investigation Activities Report, New Landfill, SVE 1996
- Remedial Design Investigation Activities Report, Old Landfill, SVE 1996
- Final Letter Report, Groundwater Sampling at the Open Detonation Area, SVE 1996
- Final SI Report, Former Waste Ammunition Detonation Area Vols. I – II, SVE 1999
- Final PIA Report for Interim Action Plan Study at Mustard Burn Site/Mustard Trenches, SVE 1994
- Final 1st, 2nd, and 3rd Long-Term Sampling and Analysis Program Report, IT 2000
- Final 5th,6th,7th and 8th Long-Term Sampling and Analysis Program Report, IT 2001
- Final 1988 & 1999 Annual Reports for Long-Term Sampling and Analysis Program, IT 2001
- Final 2000 & 2001 Annual Reports for Long-Term Sampling and Analysis Program, IT 2002
- Final Report for the RCRA Facility Investigation at the Burning Grounds, Jacobs/Stratum 2002
- Final Report for Conceptual Sitewide Groundwater Flow Model, URS Consultants, Inc. (URS) 2000
- Final Report for Phase II Sitewide Groundwater Assessment Monitoring System Evaluation, URS 2001
- Final Report for the Facility Wide Screening Level Ecological Risk Assessment, Jacobs/Stratum 2002
- Final Report for the Depot-Wide Background Soil Investigation, Jacobs/Stratum 2001
- Pristine Background Report (Addendum to the Final Depot-Wide Background Soil Investigation Report), Jacobs/Stratum 2002
- Final 2002 Annual Report for Long-Term Sampling and Analysis Program, IT August 2002
- Final 2003 January Annual Report for Long-Term Monitoring Event, Shaw Environmental and Infrastructure, Inc. (Shaw) 2003
- Final 2003 January Report Phase 3 Groundwater Assessments, URS 2003
- Corrective Measure Study (SWMU 17) Fire Training, URS 2003
- Remedial Investigations at SWMUs 12, 15, and 16, Shaw 2003
- Removal Action Closure Report (Old TNT Lagoons Area), Environmental Chemical Corporation, 2003
- Final 2004 January Report Long Term Sampling and Analysis Program, URS 2004
- Sitewide LTM, Operations, and Maintenance Plan, URS, 2004

E-3a Description of Wells

The 78 groundwater monitoring wells at BGAD are categorized as follows:

- LTM: 55
- Piezometers: 13
- Decommissioned: 10

Depths and screening are referenced in the following reports (copies on file at KDEP):

- RFI, Draft Final Report of the Pink Water Pond Area, Law 1989
- Final Report, RFI of the Propellant Burn Area, Law 1989
- RFI, Final Report of the Mustard Trench Area, Law 1989
- RFI, Final Report of the Open Detonation Area, Law 1989
- RFI, Final Report of the Dry Acid Pond Area, Law 1989 and RFI Phase II, SVE 1994
- RFA, Final Report of the Fire Training Area, Law 1989
- RFI, Final Report of the New Landfill Area, Law 1989
- RFI, Final Report of the TNT Lagoon Area, Law 1989 and RFI Phase II, SVE 1996
- RFI, Final Report of the Propellant Burn Area, Law 1989
- RFI, Final Report of the Old Landfill Area, Law 1989 and Phase II, SVE 1996
- Final 1st, 2nd, and 3rd Long-Term Sampling and Analysis Program Report, IT 2000
- Final 5th,6th,7th and 8th Long-Term Sampling and Analysis Program Report, IT 2001
- Final 1988 & 1999 Annual Reports for Long-Term Sampling and Analysis Program, IT 2001
- Final 2000 & 2001 Annual Reports for Long-Term Sampling and Analysis Program, IT 2002
- Final Report for Conceptual Sitewide Groundwater Flow Model, URS 2000
- Final Report for Phase II Sitewide Groundwater Assessment Monitoring System Evaluation, URS 2001
- Final 1st, 2nd, and 3rd Long-Term Sampling and Analysis Program Report, IT 2000
- Final 5th,6th,7th and 8th Long-Term Sampling and Analysis Program Report, IT 2001
- Final 1988 & 1999 Annual Reports for Long-Term Sampling and Analysis Program, IT 2001
- Final 2000 & 2001 Annual Reports for Long-Term Sampling and Analysis Program, IT 2002
- Final Report for Conceptual Sitewide Groundwater Flow Model, URS 2000
- Final Report for Phase II Sitewide Groundwater Assessment Monitoring System Evaluation, URS 2001
- Final Report for the Depot-Wide Background Soil Investigation, Jacobs/Stratum 2001
- Pristine Background Report (Addendum to the Final Depot-Wide Background Soil Investigation Report), Jacobs/Stratum 2002
- Final Report for the RCRA Facility Investigation at the Burning Grounds, Jacobs/Stratum 2002
- Sitewide LTM, Operations, and Maintenance Plan, URS, 2004

Casing description: Referenced in the following reports (copies on file at KDEP):

- RFI, Draft Final Report of the Pink Water Pond Area, Law 1989
- Final Report, RFI of the Propellant Burn Area, Law 1989
- RFI, Final Report of the Mustard Trench Area, Law 1989
- RFI, Final Report of the Open Detonation Area, Law 1989

- RFI, Final Report of the Dry Acid Pond Area, Law 1989 and RFI Phase II, SVE 1994
- RFA, Final Report of the Fire Training Area, Law 1989
- RFI, Final Report of the New Landfill Area, Law 1989
- RFI, Final Report of the TNT Lagoon Area, Law 1989 and RFI Phase II, SVE 1996
- RFI, Final Report of the Propellant Burn Area, Law 1989
- RFI, Final Report of the Old Landfill Area, Law 1989 and Phase II, SVE 1996
- Final Report for Conceptual Sitewide Groundwater Flow Model, URS 2000
- Final Report for Phase II Sitewide Groundwater Assessment Monitoring System Evaluation, URS 2001
- Final Report for the Depot-Wide Background Soil Investigation, Jacobs/Stratum 2001
- Pristine Background Report (Addendum to the Final Depot-Wide Background Soil Investigation Report), Jacobs/Stratum 2002
- Final Report for the RCRA Facility Investigation at the Burning Grounds, Jacobs/Stratum 2002
- Sitewide LTM, Operations, and Maintenance Plan, URS, 2004

Other well construction details: Referenced in the following reports (copies on file at KDEP):

- RFI, Draft Final Report of the Pink Water Pond Area, Law 1989
- Final Report, RFI of the Propellant Burn Area, Law 1989
- RFI, Final Report of the Mustard Trench Area, Law 1989
- RFI, Final Report of the Open Detonation Area, Law 1989
- RFI, Final Report of the Dry Acid Pond Area, Law 1989 and RFI Phase II, SVE 1994
- RFA, Final Report of the Fire Training Area, Law 1989
- RFI, Final Report of the New Landfill Area, Law 1989
- RFI, Final Report of the TNT Lagoon Area, Law 1989 and RFI Phase II, SVE 1996
- RFI, Final Report of the Propellant Burn Area, Law 1989
- RFI, Final Report of the Old Landfill Area, Law 1989 and Phase II, SVE 1996
- Final 1st, 2nd, and 3rd Long-Term Sampling and Analysis Program Report, IT 2000
- Final 5th,6th,7th and 8th Long-Term Sampling and Analysis Program Report, IT 2001
- Final 1988 & 1999 Annual Reports for Long-Term Sampling and Analysis Program, IT 2001
- Final 2000 & 2001 Annual Reports for Long-Term Sampling and Analysis Program, IT 2002
- Final Report for Conceptual Sitewide Groundwater Flow Model, URS 2000
- Final Report for Phase II Sitewide Groundwater Assessment Monitoring System Evaluation, URS 2001
- Final Report for the Depot-Wide Background Soil Investigation, Jacobs/Stratum 2001
- Pristine Background Report (Addendum to the Final Depot-Wide Background Soil Investigation Report), Jacobs/Stratum 2002

- Final Report for the RCRA Facility Investigation at the Burning Grounds, Jacobs/Stratum 2002
- Sitewide LTM, Operations, and Maintenance Plan, URS, 2004

Identification of upgradient wells and down gradient wells is discussed in the following reports (copies on file at KDEP):

- RFI, Draft Final Report of the Pink Water Pond Area, Law 1989
- Final Report, RFI of the Propellant Burn Area, Law 1989
- RFI, Final Report of the Mustard Trench Area, Law 1989
- RFI, Final Report of the Open Detonation Area, Law 1989
- RFI, Final Report of the Dry Acid Pond Area, Law 1989 and RFI Phase II, SVE 1994
- RFA, Final Report of the Fire Training Area, Law 1989
- RFI, Final Report of the New Landfill Area, Law 1989
- RFI, Final Report of the TNT Lagoon Area, Law 1989 and RFI Phase II, SVE 1996
- RFI, Final Report of the Propellant Burn Area, Law 1989
- RFI, Final Report of the Old Landfill Area, Law 1989 and Phase II, SVE 1996
- Final 1st, 2nd, and 3rd Long-Term Sampling and Analysis Program Report, IT 2000
- Final 5th,6th,7th and 8th Long-Term Sampling and Analysis Program Report, IT 2001
- Final 1988 & 1999 Annual Reports for Long-Term Sampling and Analysis Program, IT 2001
- Final 2000 & 2001 Annual Reports for Long-Term Sampling and Analysis Program, IT 2002
- Final Report for Conceptual Sitewide Groundwater Flow Model, URS 2000
- Final Report for Phase II Sitewide Groundwater Assessment Monitoring System Evaluation, URS 2001
- Final Report for the Depot-Wide Background Soil Investigation, Jacobs/Stratum 2001
- Pristine Background Report (Addendum to the Final Depot-Wide Background Soil Investigation Report), Jacobs/Stratum 2002
- Final Report for the RCRA Facility Investigation at the Burning Grounds, Jacobs/Stratum 2002
- Sitewide LTM, Operations, and Maintenance Plan, URS, 2004

E-3b Description of Sampling/Analysis Procedures

Sampling and analysis procedures are referenced in the following reports (copies on file at KDEP):

- Revised Long Term Monitoring Plan, IT, Inc., 1998
- Dry Acid Pond, Final Report, Sang Corp., 1998
- Sampling and Analysis Plan for Battery Burial Area Remedial Design Investigation Activities, SVE, 1994
- Sampling and Analysis Plan for Interim Remedial Action Plan Study for Mustard Burn/Mustard Trench
- Sampling and Analysis Plan for Site Investigation for Former Waste Ammo Area

- Draft Sampling and Analysis Plan for Interim Remedial Action Plan Study for New Landfill, SVE 1994
- Final Report, Interim Remedial Action Plan Study (Groundwater) for New Landfill, SVE 1994
- Draft Sampling and Analysis Plan for Interim Remedial Action Plan Study for Old Landfill, SVE 1994
- Final Report, Interim Remedial Action Plan Study (Groundwater) for Old Landfill, SVE 1994
- Draft Report for Interim Remedial Action Plan Study and Long Term Monitoring at New Landfill Area, SVE 1996
- Draft Report for Interim Remedial Action Plan Study and Long Term Monitoring at Old Landfill Area, SVE 1996
- Final Sampling Report, Soil Sampling DRMO Stockpile Area, BGAD, Richmond, Kentucky, SVE 1994
- Final Sampling and Analysis Plan for Combined Sites at the Blue Grass Facility, Richmond, KY, SVE 1994
- Final Sampling and Analysis Plan for the SI at the Battery Burial Area, BGAD, SVE 1994
- Final Sampling and Analysis Plan for the RFI Phase II at the Dry Acid Pond Area, BGAD, SVE 1995
- Final Sampling and Analysis Plan addendum for the Remedial Design Investigation Activities at the Dry Acid Pond Area, BGAD, SVE 1995
- Final Sampling and Analysis Plan for the RFI Phase II at the Old TNT Lagoon Area BGAD, SVE 1994
- Final Sampling and Analysis Plan for the SI for the New TNT Washout Lagoons and Boiler Blowdown Tank Discharge Areas, BGAD, SVE 1994
- Sampling and Analysis Plan for SI at the Former Waste Ammunition Detonation Area, SVE 1994
- BGAD Fire Training Area Sampling and Analysis Report, Ogden 1994
- Final Groundwater Sampling at the Open Detonation Area, SVE 1996
- Draft Final Long Term Monitoring, O&M Plan for Old Landfill, SVE 1995
- Draft Final Long Term Monitoring, O&M Plan for New Landfill, SVE 1995
- Final 1st, 2nd, and 3rd Long-Term Sampling and Analysis Program Report, IT 2000
- Final 5th,6th,7th and 8th Long-Term Sampling and Analysis Program Report, IT 2001
- Final 1988 & 1999 Annual Reports for Long-Term Sampling and Analysis Program, IT 2001
- Final 2000 & 2001 Annual Reports for Long-Term Sampling and Analysis Program, IT 2002
- Final Report for Conceptual Sitewide Groundwater Flow Model, URS 2000
- Final Report for Phase II Sitewide Groundwater Assessment Monitoring System Evaluation, URS 2001
- Final Report for the Depot-Wide Background Soil Investigation, Jacobs/Stratum 2001
- Pristine Background Report (Addendum to the Final Depot-Wide Background Soil Investigation Report), Jacobs/Stratum 2002
- Final Report for the RCRA Facility Investigation at the Burning Grounds, Jacobs/Stratum 2002
- Sitewide LTM, Operations, and Maintenance Plan, URS, 2004

E-3c Monitoring Data

Discussed in the following reports (copies on file at KDEP):

- LTM, Quarterly Monitoring Reports, IT Corp. 1998/1999
- Dry Acid Pond, Final Report, Sang Corp., 1998
- Final Groundwater Sampling at the Open Detonation Area, SVE 1996
- BGAD Fire Training Area Sampling and Analysis Report, Ogden 1994
- Final Sampling Report, Soil Sampling DRMO Stockpile Area, BGAD, Richmond, Kentucky, SVE 1994
- Final Report, Interim Remedial Action Plan Study (Groundwater) for New Landfill, SVE 1994
- Final Report, Interim Remedial Action Plan Study (Groundwater) for Old Landfill, SVE 1994
- Final SI Report Combined Sites, Vols. I, II & III, SVE 1996
- Final Report Battery Burial Area, SVE 1995
- Final Report for SI at Additional SWMUs Group B Vols. I- VII, SVE 1995
- Remedial Design Investigation Activities Report, New Landfill, SVE 1996
- Remedial Design Investigation Activities Report, Old Landfill, SVE 1996
- Final Letter Report, Groundwater Sampling at the Open Detonation Area, SVE 1996
- Final SI Report, Former Waste Ammunition Detonation Area Vols. I – II, SVE 1999
- Final PIA Report for Interim Action Plan Study at Mustard Burn Site/Mustard Trenches, SVE 1994
- Final 1st, 2nd, and 3rd Long-Term Sampling and Analysis Program Report, IT 2000
- Final 5th,6th,7th and 8th Long-Term Sampling and Analysis Program Report, IT 2001
- Final 1988 & 1999 Annual Reports for Long-Term Sampling and Analysis Program, IT 2001
- Final 2000 & 2001 Annual Reports for Long-Term Sampling and Analysis Program, IT 2002
- Final Report for Conceptual Sitewide Groundwater Flow Model, URS 2000
- Final Report for Phase II Sitewide Groundwater Assessment Monitoring System Evaluation, URS 2001
- Final Report for the Depot-Wide Background Soil Investigation, Jacobs/Stratum 2001
- Pristine Background Report (Addendum to the Final Depot-Wide Background Soil Investigation Report), Jacobs/Stratum 2002
- Final Report for the RCRA Facility Investigation at the Burning Grounds, Jacobs/Stratum 2002

Subsequent to interim status groundwater reports:

- 2005 Annual Report for Long-Term Management Inactive Waste Management Areas RCRA Facilities, URS August 2006
- 2006 Annual Report for Long-Term Management Inactive Waste Management Areas RCRA Facilities, URS October 2006
- 2007 Annual Report for Long-Term Management Inactive Waste Management Areas RCRA Facilities, URS October 2007

- 2008 Annual Report for Long-Term Management Inactive Waste Management Areas RCRA Facilities, URS November 2008
- 2009 Annual Report for Long-Term Management Inactive Waste Management Areas RCRA Facilities, URS November 2009
- 2010 Annual Report for Long-Term Management Inactive Waste Management Areas RCRA Facilities, HydroGeologic, Inc. October 2010
- Final 2011 Long-Term Monitoring Report Inactive Waste Management Areas, HydroGeologic, Inc. June 2012
- Final 2012 Long-Term Monitoring Report Inactive Waste Management Areas, HydroGeologic, Inc. June 2012
- Final 2013 Long-Term Monitoring Report Inactive Waste Management Areas, HydroGeologic, Inc. August 2013
- Final Closure Phase 2 Resource Conservation and Recovery Act Facility Investigation for Site Closeout for Washout Lagoons, ERT Inc. October 2013
- Final Project Management Plan Environmental Restoration Services, FPM Remediations Inc. May 2014
- Monitoring Well Abandonment Plan Environmental Restoration Services, FPM Remediations Inc. January 2015
- Final 2014 Annual Long Term Monitoring Report: SWMU 002 (BLGR-006)-Former Mustard Trenches Area and SWMU 029 (BLGR-012)-Old Trinitrotoluene Lagoons, FPM Remediations Inc. September 2015

Table E-3 provides a listing of all SWMUs and AOCs sites and includes the required corrective action for reference. Figure E-4 is a map showing the approximate locations of all SWMUs and AOCs listed in the table that required further investigation.

E-3d Monitoring of SWMUs and AOCs

See comments under future action section of Table E-3.

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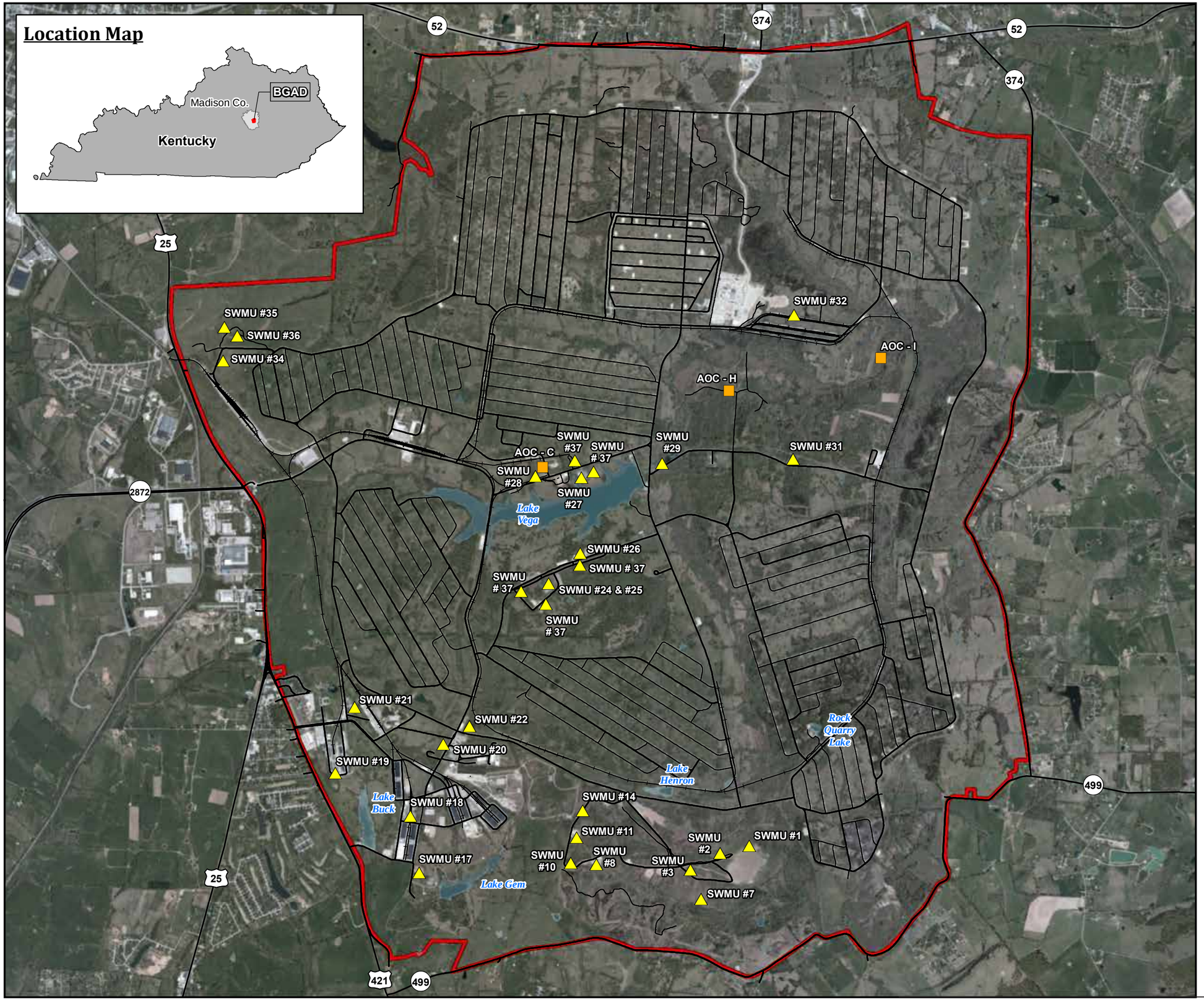

Explanation:

- AOC
- SWMU
- Railroad
- Primary Road
- Secondary Road
- Water Body
- Installation Boundary

0 0.25 0.5 1 Miles

0 1,500 3,000 6,000 Feet

N

Projection: KY State Plane South, Feet, NAD 1983

Map Created By: USACE-LRL
Date: 2/11/2014

Data Sources:
Transportation - KYTC, 2006
Installation Data - BGAD, 2012
Aerial Photography - ESRI, 2010

FIGURE E-4
Active SWMU and AOC Map
Blue Grass Army Depot
Madison County, KY

ch2m.

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ATTACHMENT 5

Page C-3, OB/OD Permit Application

Table C-1. Military Munitions Families

Munitions Family	Example Waste Items	Available Treatment Method
Pyrotechnics/Illumination/ Tracer	Includes a variety of ammunition used for illumination, marking, spotting, signaling, simulating or tracing	OD
High Explosive Components and Devices	Detonators, boosters, bursting charges not otherwise configured with an ammunition	OD or CDC
High Explosive Cartridges	Artillery or gun ammunition with HE projectile and a propelling charge such as 90 mm, 81 mm mortar, 30 mm fuzed and unfuzed cartridges	OD or CDC
High Explosive D	Ammunition containing Explosive D (also known as ammonium picrate or yellow D)	OD or CDC
Bulk High Explosive	TNT, pentaerythritol tetranitrate (PETN), cyclotetramethylenetetranitramine (HMX), RDX, Comp A, Comp B, Comp C-4, plastic bonded explosives (PBXs), Black Powder	OD or CDC
High Explosive Grenades	Hand or rifle grenades containing explosive fillers	OD or CDC
High Explosive Depth Charges and Underwater Munitions	High explosive marine depth charges and underwater mines	OD or CDC
High Explosive Cluster Bomb Units and Submunitions	Anti-tank mines, anti-personnel grenades or bomb loaded units, projectiles or warheads containing submunitions	OD or CDC
High Explosive Projectiles and Warheads	Projectiles, warheads, mortars or similar devices that do not have a cartridge case, propellant or rocket motor associated	OD or CDC
HE Rockets	Includes complete rounds of rocket ammunition containing warhead, fuze, and rocket motor.	OD or CDC
Demolition Material	Includes all demolition materials such as TNT, C-4, cratering charges, shaped charges, detonating cord, flexible sheet explosives, miscellaneous standard and non-standard items used as donor material, plastic caps, time fuze, det cord, etc.	OD or CDC
Land Mines	Includes all high explosive filled land mines including dispersing mines and dispersing devices	OD or CDC
Bulk Propellants	Includes all propellants in bulk form	OB
Propellant Charges and Increments	Includes packaged propelling charges and propelling increments	OB
Propellant Munitions Components	Rocket motors, cartridge actuated devices, propellant actuated devices, expelling charges, 20 mm or larger ammunition with inert (except may include tracers or incendiary mixes) or flechette projectiles, etc.	OB, OD or CDC
Small Arms Ammunition	Small caliber ammunition	OD
Fuzes	Fuzes – all types	OB, OD or CDC

In addition to WMM, BGAD may have occasion to generate ~~small quantities of~~ other energetic wastes associated with BGAD munitions activities but not defined as military munition or WMM. S~~For example s~~uch energetic waste streams w~~c~~ould include:

- S~~s~~olid waste (e.g., gauze, q-tips, wipes, paper towels) determined to be contaminated with energetic materials to the extent that these pose a potential fire hazard when disposed in the solid waste stream and deemed not suitable for shipment. Such wastes could be generated as a result of on-going stability testing or clean-up of spills, for example, and would be expected to be generated in small quanitities.
- ~~Other potential energetic wastes include~~Non-munition metallic debris or components that, due to size or concentration of energetic material cannot be processed through the BGAD flashing furnace, to include, but not limited to, metallic debris or components generated during ~~. For example, during~~ future decommissioning of the BGAD W~~w~~ashout F~~f~~acility.

Treatment operations for non-munitions energetic wastes will be wholly consistent with munitions waste treatment operations. Solid waste contaminated with energetic material will be treated at the

OB unit by adding the waste stream in small quantities to scheduled propellant burns. Non-munition metallic debris or components with confined spaces potentially containing energetic material (and therefore presenting a potential to detonate) will be treated at the OD unit as a surface detonation. The item will be placed on the soil surface or in a pit, but not covered in soil. Donor charges consistent with those in use for OD of WMM will be applied. Upon detonation of the donor charge, energetic material in confined spaces will be exposed and detonated. Non-munitions metallic debris or components without confined spaces, where residual energetic material may be adhered to surfaces will be placed into a burn pan during a scheduled propellant burn. Ignition of the propellant will serve to "flash" residual energetic material on the metallic debris or component.

Metallic debris/components rendered "safe" through these procedures will be recycled through the BGAD QRP. ~~, portions of pipe that contain hidden high concentrations of explosives posing a potential explosive hazard could be safely disposed by BD or large metal equipment too large or unwieldy for the flashing furnace could be placed into a burn pan with propellant waste and "flashed". Washout facility decommissioning could also result in dried, energetic sludge that could be used as donor or grossly contaminated carbon filters determined unsafe foroff-site transport. BGAD requests through this application, the inclusion of energetic wastes such as these that are not specifically defined as WMM~~.

ATTACHMENT 6

Page D-9, CDC Permit Application

Operating Conditions

The D-100 CDC offers the capability for treatment employing either a detonation or burn configuration. The system operates generally the same in either configuration. In general, the operation is described as follows:

The D-100 CDC is operated in batch and is manually loaded, fired, and unloaded. WMM/energetic waste is placed into the armored chamber and suspended from a chain extending from the interior chamber ceiling (when used in detonation configuration) or placed into a firing stand (when used in a burn configuration). Once secured within the chamber, an initiating charge is placed in or onto the waste item(s), the hydraulic front chamber doors are sealed shut, and voltage is delivered through a firing control unit that results in either a detonation or burn. Overpressure is directed from the chamber through a venting system to an expansion chamber and then through the APCU. After the treatment event, the rear exhaust door of the armored chamber is opened and the chamber evacuated. When the front doors are opened, the chamber is completely evacuated and cooled to allow personnel re-entry.

General D-100 CDC operating conditions per BGAD demilitarization SOPs are as follows:

- D-100 CDC operations may be conducted year round and there are no meteorological restrictions.
- The use of personal electronics and cell phones is strictly prohibited during any operation involving exposed explosives or unpackaged munitions.
- D-100 CDC operations will not be conducted during electrical storms when treating electromagnetic radiation (EMR) susceptible munitions, including rocket motors, exposed explosive, and propellants. Electrical storms and thunderstorms present a potential safety hazard to persons handling energetic materials and the Supervisor will always make a decision based on sound explosives safety principals.
- Typical equipment in use for D-100 CDC operations includes a forklift, fire extinguishers, and thermal indicator.
- Personal Protective Equipment (PPE) includes safety footwear (i.e., conductive shoes), long-sleeve flame retardant coveralls, safety glasses or goggles, leather gloves, and hearing protection (as needed). Personnel also are evaluated by Industrial Hygiene to determine the need for other PPE, such as respirators, for specific operations.
- If repeated treatment events are to be conducted, the temperatures of interior surfaces of the chamber, firing stand, and/or rocket motor body will be assessed by thermal indicator to assess when temperature is acceptable for handling.
- A mandatory 30 minutes wait time is required in the event of a misfire.
- Only two persons will enter the chamber to investigate misfire.
- Half-day quantity of WMM/energetic waste and donor charges (but not to exceed 1,000 lb NEW) is delivered to Building 280 in the morning and again in the afternoon.
- Detonators (for detonation) or igniters (for burns) are kept in a “Day Box” during the operating day.
- ~~If WMM/energetic waste is delivered to Building 280 but is not treated on that day, it is repacked, a Hazardous Waste label is applied to each container, and the WMM/energetic waste is placed into appropriate Hazardous Waste storage. WMM/energetic waste is not stored at Building 280 overnight.~~
- Supervisor documents incoming material in logbook (date, document number, NSN, lot number, and quantity).