Volume 2

24915-00-GPE-GGPT-00394

Resource Conservation and Recovery Act (RCRA)

Class 3 Hazardous Waste Storage & Treatment Permit Modification Request, Offsite Shipment and Disposal of Agent Hydrolysate

for the Blue Grass Chemical Agent-Destruction Pilot Plant
Blue Grass Army Depot, Richmond, Kentucky

EPA ID KY8-213-820-105

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Submitted 10-MAR-2021, Revision 1

Part C: Waste Analysis Plan [401 KAR 39:060, Section 5, 39:090, Section 1 & 40 CFR 124, 264, and 270]

This Waste Analysis Plan (WAP) describes the procedures used to obtain chemical and physical information and data pertaining to the wastes to ensure proper storage, treatment, disposal, and compliance with the land disposal restrictions (LDR) requirements. It specifies the generator/process knowledge and/or analytical methods used to ensure the proper treatment and/or disposal of both the wastes received from BGAD and the wastes produced by BGCAPP (secondary wastes). This WAP describes the following:

1. Use of generator knowledge
2. Physical and chemical analyses and/or monitoring[1] BGCAPP will conduct (if generator knowledge is insufficient to characterize a waste or waste stream) before hazardous wastes are stored, treated, or transported off site for further treatment and/or disposal
3. Frequency of sampling and analyses
4. Sample collection methods
5. Analytical methods
6. Quality assurance (QA) practices used to ensure the validity of the analytical results
7. How this information is used to ensure the proper storage, treatment, and/or disposal of hazardous wastes

This information is summarized in Table C-1 through Table C-4.

BGCAPP receives, from BGAD, the waste streams described in this section and treats the streams on site or transports these waste streams off site for treatment and/or disposal. BGCAPP selected the characterization criteria for each waste stream based on process knowledge; previous analytical results obtained for similar waste streams at other chemical agent disposal facilities; homogeneity of the waste; ability to obtain a representative sample; LDR notification requirements; and/or Department of Defense (DoD) manufacturing specifications.

C-1: Introduction

The assembled chemical munitions stored at BGAD contain both chemical agent and energetic materials (e.g., propellant and/or explosive charges). The United States (U.S.) Army knowledge of munitions design and the composition of the energetics, chemical agents, and munition components are adequate for acceptance and treatment of the stored munitions by BGCAPP. Properties of the chemical agents, energetics, and propellants to be processed in the BGCAPP Main Plant are summarized in Table C-3. KDEP approved an RD&D permit allowing BGCAPP to begin destruction of the GB containing munitions stored at BGAD based on this available information. The information gathered during the RD&D operation, as part of the BGCAPP RD&D testing and demonstration of BGCAPP, added to available information on the process wastes treated, stored, and produced by the full-scale pilot plant.

BGCAPP treats GB and VX through reaction with a caustic solution; however, this document is prepared to support the Part B permit and includes details for the treatment of VX and GB and process and secondary derived from wastes. The resulting VX hydrolysates and GB

[1] "Analyses and/or monitoring" also includes VX and GB agent headspace air monitoring of a waste in an enclosed space to determine agent contamination off-gassing levels in lieu of direct waste analysis of solid materials.

hydrolysates are sampled and analyzed to confirm agent hydrolysate meets the United States Army Public Health Command (USAPHC) Chemical Agent Health-Based Standards and Guidelines waste control limit (WCL) and the 99.9999 percent agent destruction and removal efficiency (DRE) requirement before being released from the MDB for temporary storage in the Hydrolysate Storage Area (HSA) permitted tanks and before offsite shipment for treatment and disposal.

Upon completion of agent treatment in the agent hydrolyzer, the agent is cooled, and a sample is collected from the agent hydrolyzer to ensure sufficient agent destruction has occurred. Prior to release from the MDB, VX and GB hydrolysates will be required to meet the lower of the agent concentration from the DRE requirement or the WCLs contained in the USAPHC guidelines for release. For GB rockets, the GB agent hydrolysate will be required to meet the DRE agent hydrolysate concentration, which is substantially lower than the USAPHC WCL for GB (8,300 µg/L for GB liquid waste). For VX projectiles and rockets, the VX agent hydrolysate will be required to meet the USAPHC WCL of 80 µg/L VX, which is lower than the DRE requirement. The treatment levels required for offsite shipment for each campaign will be the same as those required for release from the MDB. In addition, both Off-gas Treatment Metal Parts Treater (OTM) Condensate and Spent Decontamination Solution (SDS) that will be shipped offsite will be required to meet the same criteria as the agent hydrolysate for the respective campaign prior to shipment.

Major components of waste streams to be characterized and approximate concentrations are provided in Table C-5.

C-1a: Use of Process Knowledge

Process knowledge will be used to ascertain potential agent contamination based on area air monitoring readings, operational history, instrumentation data, or other process information; process knowledge will also be used to determine applicability of other waste codes. Where such data indicates waste is potentially agent contaminated, or where decontamination procedures are executed, agent monitoring will be used to assess residual agent contamination levels for identification of potential handling hazards. Agent monitoring will be conducted in accordance with 24915-00-9PL-00-00001, Laboratory Analysis and Monitoring Plan (included with this application as Appendix C-2), for the classification of secondary wastes to support disposition. Agent VX headspace monitoring will be performed at the VSL ($1x10^{-5}$ milligrams per cubic meter [mg/m3] for VX), with agent GB headspace monitoring also performed at the VSL ($1x10^{-3}$ milligrams per cubic meter [mg/m3] for GB). Materials are bagged or contained in an agent tight barrier of sufficient volume to permit sample air to be withdrawn while minimizing dilution with incoming air. One complete sampling cycle of the near real time (NRT) monitor, MINICAMS®, will be required, or depot area air monitoring system (DAAMS) based monitoring can be performed. All such wastes will retain the N001 and/or N002 waste code or associated listed process waste codes per 401 KAR 39:060 Section 3 (4) [N101, N102, N201, N202, N301, N302, N401, N402, N501, N502, N601, N602, N701, N702, N801, N802, N901, or N902] in addition to other applicable waste codes based on application of process knowledge (e.g., addition of characteristic metal codes to munitions). Agent monitoring will be used in support of shipment and treatment requirements in accordance with BGCAPP procedures and the bounding transportation risk assessment (BTRA); included in Appendix C-1.

C-1b: Rockets, Rocket Motor (RM) and Shipping and Firing Tube (SFT) Management

Due to the lower volatility of VX compared to GB an additional monitoring step is added for VX rockets. The following narrative is provided as a conceptual process, specific details may be adjusted as the monitoring process is systemized and finalized. Non-Leaking rockets and Shipping and Firing Tubes (SFTs) are transferred from the EONC into a Rocket Motor Glove Box (RMGB) for additional monitoring and waste characterization. The rockets and SFTs are secured in the RMGB, and the RMGB is closed and sealed. The RMGB maintains a negative pressure relative to UPA-1 via an induced draft fan mounted below the RMGB thereby protecting workers from exposure to VX agent. The RMGB atmosphere is discharged via duct work directly into MDB UPA-1 HVAC ductwork downstream of the UPA-1 damper. The MDB HVAC duct in UPA-1 pulls air from UPA-1 and exhausts into the EBH room. The monitoring process begins by opening the monitoring ports at either end of the SFTs. There are two minicams used for the RMGB monitoring process, one minicams continuously monitors the RMGB atmosphere the other minicams is used to monitor the rockets themselves. Rocket monitoring is accomplished by inserting the end of the monitoring probe into an SFT monitoring port at one end of the SFT thereby drawing air through the SFT. Opening monitoring ports at both ends of the SFT allows a sufficient volume of air for agent monitoring to be draw through the SFT and into the MINICAMS without creating a vacuum in the SFT. The probe is moved to each rocket/SFT to monitor the atmosphere in each.

RMs will be separated from the warheads and the warheads from their SFTs. The motors and SFTs will be monitored for agent prior to release for shipment. The SFTs contain polychlorinated biphenyls (PCBs) at an average concentration of 1,247 parts per million (ppm) and will therefore be managed in accordance with the Toxic Substances Control Act (TSCA).

Contaminated rocket motors (CRMs) identified during rocket processing will be transferred to a Single Round Container (SRC) overpack container. The SRC is a two-section flanged pipe overpack that was specifically developed to contain the M55 in a substantial steel shell; it has been subjected to a helium leak test as part of the acceptance process. These overpack containers will be placed back in storage in the CHB or within permitted storage in the Chemical Limited Area (CLA) at Blue Grass Chemical Activity (BGCA) and then treated with other known leakers.

C-1c: Waste Stream Classification

BGCAPP generates a variety of process and secondary waste streams during its operations.

1. Process Waste Streams – Process waste streams include metal parts treater (MPT) residue (i.e., munition bodies, ash, particulates, and other treatment residue); RMs; rocket SFTs; and agent hydrolysate.
2. Secondary Waste Streams – Secondary waste streams produced are by-products of BGCAPP treatment processes (i.e., due to removing portions of the waste received or toxic area entries/maintenance activities). These wastes include agent-contaminated or agent-derived wastes as well as wastes that are not agent-derived or that are considered hazardous due to either a hazardous waste characteristic or listing. These secondary wastes include: agent-contaminated dunnage; munitions dunnage not contaminated by agent; agent-contaminated/agent-derived wastes [e.g., agent-contaminated personal protective equipment [PPE], spent-activated carbon and filters (including mask filters and as well as other miscellaneous sources), agent-contaminated rags and trash]; laboratory wastes; maintenance and miscellaneous

components/parts, oils, hydraulic fluids, and paints not contaminated by agent; and metals (e.g., from reverse assembly of munitions). The MPT primarily treats munitions and metal parts and may also treat a portion of secondary waste solids. BGCAPP personnel place the remaining wastes into containers and store the containerized wastes on-site before off-site shipment to appropriately permitted, commercial TSDFs. Agent-contaminated solid wastes will be decontaminated and headspace monitoring performed to determine if these meet <1.0 VSL for VX and GB. Agent headspace monitoring is performed by placing an airtight cover on the wastes or bagging the wastes in an airtight bag and after a defined time period measuring the headspace above the wastes or in the bag by MINICAMS®. Containers with readings < 1 VSL can be shipped to an appropriately permitted TSDF. Containers with an agent headspace reading of ≥ 1 VSL will be subject to the BTRA for shipment off-site for treatment and disposal in accordance with applicable permit and regulatory requirements for hazardous secondary waste. Shipment of liquids (and potentially some solids for which agent headspace monitoring cannot be performed) may be shipped off-site for treatment and disposal at a permitted TSDF. These waste shipments will be IAW requirements contained in US Army Public Health Command (USAPHC) Chemical Agent Health-Based Standards and Guidelines (July 2011, see Appendix C-1). For waste contaminated with VX chemical agent the following VX concentrations are identified, 10 mg/kg solids and 0.08 mg/L liquid. For waste contaminated with GB chemical agent the following GB concentrations are identified, 320 mg/kg solids and 8.3 mg/L liquid. Any secondary waste containing multiple phases will be characterized according to EPA SW-846 method recommendations (e.g., homogenization of phases prior to sampling and analysis or sampling and analysis of separate phases).

The hazardous wastes received by BGCAPP are stored and transported within BGAD facility boundaries. These hazardous wastes are chemical munitions that include both chemical agents (i.e., nerve agents GB and VX); and energetics (i.e., explosives and propellants). The U.S. Army manufactured these chemical munitions and therefore has knowledge of their composition that it has supplemented with sampling and analyses to assess potential degradation during storage. This generator knowledge provides an acceptable means of waste characterization for the receipt of these hazardous wastes without any further analysis.

Table C-1 identifies each waste stream that is generated, stored, and/or treated during chemical munitions processing at BGCAPP that will undergo analyses to verify proper waste designation. This table identifies the waste stream, planned treatment or disposal method, analyses, potentially applicable analytical methods and clearance criteria, frequency of analysis, and the regulatory citation for the relevant definition or criterion for designating the waste as hazardous or requiring further characterization. The hazardous waste streams generated and/or stored within the BGCAPP permitted waste storage areas and tanks include the following along with potential federal and state waste codes:

1. Chemical agent hydrolysate [N301 and N302]
2. Spent decontamination solution (N901,N902, N301, and/or N302)
3. MPT residue (e.g., ash, miscellaneous metal parts from munitions) (N201, N202)
4. Agent-contaminated dunnage (N002)
5. Non-contaminated munitions dunnage
6. Uncontaminated RMs, Propellent component of RM, SFTs, and end-caps associated with GB or VX munitions (N101, N102)
7. Agent-contaminated/agent-derived Kentucky (KY) hazardous wastes and PPE (N001, N002)

8. Agent-contaminated carbon, high-efficiency particulate air (HEPA) filters and pre-filters, trash, rags, and components/parts from operations and maintenance (O&M) activities (N001, N002, and/or D022, and potentially D003 for APR carbon canisters)
9. Laboratory wastes (N701, N702 and/or N703)
10. Maintenance and miscellaneous wastes (N001, N002, N003, N101, N102, N201, N202, N301, N302, N701, N702 and/or N703).
11. OTM Condensate (N801, N802)

BGCAPP segregates these secondary wastes in accordance with the waste characteristics and compatibility requirements and either places in permitted storage in DOT-approved containers/storage tanks or treats on-site in the MPT or ships offsite for treatment and disposal.

PPE and other agent-derived hazardous wastes produced from BGCAPP O&M activities will be temporarily contained in plastic bags at or near the point of generation before the bags will be placed into DOT-approved containers for storage in permitted container storage areas. Based on VX or GB agent headspace monitoring results, these bagged wastes will either be placed into a drum for off-site shipment/disposal or processed through the MPT. Specific BGCAPP procedures will specify any such wastes will not contain free liquids above allowable limits. The following sections present supplemental information concerning these waste streams.

For the specific process waste streams listed in Table C-1, material and energy balances (M&EBs) and information in standard operating procedures (SOPs), maintenance operating procedures (MOPs), and laboratory operating procedures (LOPs) will be used in estimating waste compositions to support laboratory waste analysis (i.e., specific analyte requirements and dilution determination). In addition, waste mixtures containing more than one characteristic or listed waste code will be treated or shipped for treatment and disposal to meet the most stringent treatment standard, as applicable. The M&EBs provide information on the composition expected in each of the waste streams listed in Table C-1.

Notifications (e.g., LDR notifications), certifications (e.g., analysis certificates), and other records (e.g., sampling logs, chains-of-custody, process knowledge documentation) will be kept on file in accordance with project record requirements. These shall be maintained for a period in accordance with all regulatory requirements.

C-1d: Chemical Agent Hydrolysates and Spent Decontamination Solution

The reaction of chemical agent with a caustic solution produces hydrolysate. Hydrolysate produced from chemical agents is corrosive (pH >12.5) and will carry the corresponding D002 waste code as well as the applicable agent code (N301 or N302). Preliminary characterization of hydrolysates was performed during previous testing, and additional analyses as shown in Table C-1 as needed will be obtained to support Department of Transportation (DOT) requirements for offsite shipment and the characterization necessary for treatment and disposal at the receiving facility. BGCAPP will verify and identify RCRA characteristics and appropriate waste numbers by sampling and analyzing initial hydrolysates produced for each agent campaign. BGCAPP will obtain concentrations in agent neutralization reactors (ANR)s that will have been demonstrated to achieve 99.9999 percent DRE for agent (i.e., with analytical confirmation) before transfer to the HSA. Prior to offsite shipment and disposal, agent hydrolysate will also be required to meet the USAPHC waste control limits (WCLs), which have the potential to be lower than the permitted DRE limits for VX and GB.

BGCAPP will generate spent decontamination solution from the decontamination of agent hotspots, spills, PPE, trash, and components from O&M activities. The SDS tanks that collect spent decontamination solutions are tied to Category A, Category B, and Category C sumps

located in secondary containment areas and will also receive any liquids released to secondary containment (large spills) or otherwise collected in sumps.

Spent decontamination solution from these cleanup or maintenance related activities and any other liquid collected in sumps in Category A, Category B, or Category C areas will be transferred to the SDS tanks. The preferred disposition path for the collected solutions will be use on site in the ANRs during agent treatment operations; if used as makeup water in the ANRs, no further characterization of these solutions will be required since agent characterization is required for agent hydrolysate prior to release from the MDB. However, in some cases (e.g., if larger quantities of SDS solutions are available than can be used in the MDB ANR processes) these solutions will be treated as necessary to meet the release criteria (the lower of the WCL or DRE required agent hydrolysate concentration). After verification that release criteria is met, the SDS will either be transferred to the HSS tanks or shipped for off-site treatment and disposal. All such waste associated with a specific agent campaign will be managed and transferred out of the MDB prior to the start of a new agent campaign. BGCAPP will designate chemical agent hydrolysates and some decontamination solutions as D002 wastes, based on the pH of the solutions.

C-1e: Metals Parts Treater (MPT) Residue

The MPT waste streams will include scrap metal and ash residue. Scrap metal will be recycled. The primary waste characteristic of concern for the ash residue waste stream is metals concentrations (e.g., D008, D009) as a result of metals in the processed munitions components; RCRA-regulated metals (D004, D006, D007, D008) are also expected in munitions paint based on previous demilitarization experience. In addition, the ash residue waste stream and secondary waste streams have the potential to contain other RCRA-regulated metals (e.g., D005, D010, D011). Since the residue is considered agent-derived waste it will carry the N201 or N202 codes.

MPT reaction chemistry based on agent GB and VX feed and operating conditions (including air in-leakage) is described in detail in BGCAPP calculation 24915-07-M5C-MPT-00001 *MPT Mass and Energy Balances*. In summary, pyrolysis chemistry is expected to reflect the following logic:

1. Atomic oxygen internal to the organic compounds preferentially reacts to first form P_4O_{10}. Residual oxygen will then form CO.
2. Carbon remaining following the formation of CO will form CH_4 to the extent that internal hydrogen is present.
3. Residual atomic carbon and hydrogen will form solid carbon and H_2.

Gases and volatile compounds will be passed to the MPT OTM system. As indicated by the reactions, some carbon (char), in addition to some RCRA metals from paint, will remain with the scrap metal exiting the MPTs during treatment of munitions. Characterization will not be performed on this scrap metal since it will be shipped for recycling. However, particulates and ash separated from scrap metal and from secondary waste ash exiting the MPTs will be characterized to support disposal, as indicated in Table C-1.

Analysis for characterization of agent on scrap metal and residues will not be performed. The MPT was designed to meet a U.S. Army performance standard for agent destruction (i.e., 1,000 degrees Fahrenheit [°F] for 15 minutes) and was tested under the RD&D permit to demonstrate it can be operated to achieve this performance standard. By treating agent-contaminated debris in the MPT to 1,000°F for 15 minutes, the chemical agent will be destroyed to Army standards allowing for off-site shipment and disposal. The Metal Parts Treater Monitoring Plan submitted to KDEP serves as an indicator that the U.S. Army performance requirements have been met. In addition to the appropriate N waste codes per 401 KAR 39:060 Section 3(4) [N201 or N202], the MPT residue waste stream will be analyzed

to establish accurate waste characterization, including the potential for other hazardous characteristic codes previously discussed (and potentially include any, but not necessarily all, of the following characteristic waste codes, D004, D005, D006, D007, D008, D009, D010, D011). The applicability of these characteristic waste codes will be determined by analyses as indicated in Table C-1. If it is determined these characteristic waste codes/numbers are applicable to the residues from the MPT, then disposal of the MPT residues will comply with RCRA regulations for disposal and/or treatment of these characteristically hazardous wastes.

C-1f: Agent-Contaminated Dunnage

Generator knowledge and/or VX or GB agent headspace monitoring will be used to determine whether chemical agent from leaking munitions has mixed with these items. BGCAPP designates dunnage contaminated with agent based on known agent leaks or the results of VX headspace monitoring as N002 wastes and GB headspace monitoring as N001. These wastes also potentially contain the preservatives Cresol (D026) and pentachlorophenol (D037) above the regulatory levels (200 milligrams per liter [mg/L] and 100 mg/L, respectively), as described in Section C-1h below. Agent-contaminated dunnage will either be treated in the MPTs or shipped off-site in accordance with BTRA or USAPHC Chemical Agent Health-Based Standards and Guidelines requirements described in Section C-1c. Additional characterization of contaminated dunnage will be based on generator knowledge (see Section C-2e below) or analyses as indicated in Table C-1.

C-1g: Munitions Dunnage (Non-Contaminated)

During manufacture, the U.S. Army treated some of the pallets associated with the stored chemical munitions with preservatives (D026 or D037). Chemical agents contaminate only a small portion of the munitions (i.e., "leakers"); however, the presence of these preservatives above the associated regulatory levels (200 mg/L and 100 mg/L for D026 and D037, respectively) might be possible in even the non-agent-contaminated pallets, leading to their potential classification as hazardous waste. BGCA has informed BGCAPP that there should be no treated pallets currently in use for the storage of chemical munitions and that current Army requirements do not allow for their use. BGCA has further indicated that pallets procured and used previous to these requirements and treated with pentachlorophenol were marked/stamped with the letter "P" indicating clearly that these were treated with pentachlorophenol. Therefore, BGCAPP will visually examine munitions pallets for the presence of the “P” so as to divide the pallets into two populations. A statistically representative number of pallets from each population as necessary to demonstrate a 90% upper confidence limit for each population will be sampled and analyzed for pentachlorophenol and cresols. The results will be used to determine whether each population is above or below regulatory levels for toxicity characteristics. Alternatively, another management option will be to manage and dispose all pallets marked with “P as characteristically hazardous for D026 and D037.

Pallets determined not to be hazardous waste will be shipped for disposal in a Subtitle D landfill; these will not be candidates for recycling or reuse.

C-1h: RMs and SFTs

RMs removed from the M55 rockets are D001 and D003 and contain D008 and will be considered N101 or N102 listed wastes. The rockets being treated at BGCAPP are contained in SFTs that were used by the U.S. Army as both the storage and shipping containers and the firing/launching tubes. RM and SFT segments will be placed in DOT approved containers and stored until they are sent to an approved TSDF or otherwise managed for disposal.

After a container of RMs or SFTs is filled, it will be conveyed into the container monitoring airlock, where a monitoring hood is lowered into position over the box/container and the headspace is monitored with MINICAMS® for the presence of agent. If agent is detected by MINICAMS® and confirmed, the hood is lifted, and transfer conveyor is reversed to allow movement of the container out of the airlock and back into the motor packing room. The contaminated RM(s) or SFT(s) will be overpacked for subsequent processing during the leaker campaign.

If agent is not detected in the monitoring airlock, the container will proceed forward into the motor shipping room where operators will perform a visual inspection and fasten on the appropriate container cover. Closed RM boxes will be transported via forklift through the covered loading area to the box storage room. Covered SFTs will be transported via forklift to a waste container.

C-1i: Agent Contaminated/Agent Derived Kentucky (KY) Hazardous Wastes

Agent-Contaminated PPE – PPE includes demilitarization protective ensemble (DPE) or comparable commercially available suits, butyl rubber suits, masks, aprons, hoods, gloves, boots, and other equipment. These items will be agent-derived and therefore are designated as N001 or N002 wastes. BGCAPP will use VX and GB agent headspace monitoring and/or generator knowledge to characterize these wastes as <1 VSL or ≥1 VSL using the alarm criteria in the approved MINICAMS/DAAMS Monitoring Table. Wastes that are <1 VSL will be shipped off-site to a permitted TSDF. Wastes that are ≥1 VSL will either be treated onsite in the MPTs or shipped off-site for treatment and disposal in accordance with BTRA requirements, as discussed in Section C-1c.

Agent-Contaminated, Spent-Activated Carbon and HEPA Filters and Pre-filters – Monitoring between the carbon banks will be used to determine whether the spent-activated carbon in the ventilation system is agent-contaminated and therefore are designated as N001, N002 and/or D022 wastes. The initial HEPA filter and pre-filter elements associated with the carbon banks and the first carbon bank are agent-derived and therefore are designated as N001, N002 and/or D022 wastes, unless carbon was changed out between the GB and VX projectile campaigns and between the VX and GB rocket campaigns, in which case only the active campaign code will apply. Characterization of the remaining carbon banks will be based on results of monitoring between the banks. Carbon from the first bank and other banks that had agent breakthrough at any confirmed level by DAAMS (with confirmation defined as verified to be ≥1 VSL) and the HEPA filter and pre-filter elements will be shipped offsite for treatment and disposal in accordance with BTRA requirements, as discussed in Section C-1c. Carbon from other banks where monitoring indicated all results less than MINICAMS® detection limits will be shipped off-site for disposal but not be designated as N001, N002, and/or D022[2].

Agent-Contaminated Trash, Rags, and Components/Parts from O&M – Contaminated trash, rags, and components/parts from O&M activities include any of the following materials:

1. Metal items (i.e., pump components, piping components, valves, fittings, tools, munition components, and other items) made of aluminum, steel, chromium, copper, brass, or alloys

[2] Agent will serve as the indicator for chloroform breakthrough for the carbon. Since GB and VX will be present in much higher concentrations compared to chloroform, GB or VX will have breakthrough prior to chloroform; consequently, characterization of filter, pre-filters, and carbon for characteristic hazard of D022 will be the same as the N001 and/or N002 code assignments.

2. Nonmetallic trash or parts (i.e., plastic hoses, plastic parts, rubber parts, polyvinyl chloride piping), nylon components, polyester materials, polyethylene materials, phenolics, thermoplastics, glassware, concrete, gasket materials, plaster, rags, and other disposable materials.

BGCAPP will use VX or GB agent headspace monitoring and/or generator knowledge to characterize these wastes as <1 VSL or ≥1 VSL. Wastes that are <1 VSL will be shipped off-site to a permitted TSDF. Wastes that are ≥1 VSL will either be treated onsite in the MPTs or shipped off-site for treatment and disposal in accordance with BTRA requirements, as discussed in Section C-1c.

C-1j: Laboratory Wastes

BGCAPP manages a variety of laboratory wastes as hazardous wastes. These potentially include, but are not limited to, waste codes D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D022, D024, D026, D027, D028, D029, D035, D037, D038, and D039 as well as listed wastes (e.g., F001, F002, F003, F004, F005), and also include KY-listed, agent-derived wastes [i.e., N001, N002, and other applicable codes listed in 401 KAR 39:060 Section 3(4), including N701 and N702]. Discarded chemicals (various U and P waste codes) will also potentially be periodically generated and may include but are not limited to, waste codes P098, P106, U002, U003, U044, U080, U154, U188, U196, and U213.

Both treated agent-related and non-agent hazardous wastes are stored in the BGCAPP Laboratory in approved waste containers. Wastes stored in containers larger than 26 gallons will meet the container Level 1 control requirements found in 40 CFR 264.1086, Standards: Containers.

C-1k: Maintenance and Miscellaneous Wastes (e.g., Oils, Hydraulic Fluids, Paints, and Spent Solvents)

Routine maintenance activities will generate hazardous wastes that have the potential to be agent-contaminated. Agent-contaminated materials in this waste stream may be identified with N2001, N002, N201, N202, N301, N302, N701, N701, N801, N801, N901 and/or N902. These types of wastes that are agent- contaminated will be properly disposed based on agent level, as discussed previously. Some of these wastes, if not agent-contaminated, may be recycled or treated as solid hazardous wastes or non-hazardous wastes (e.g., oils, hydraulic fluids). Waste numbers associated with these wastes potentially include D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, and D011; and F001, F002, F003, F004, F005.

C-1l: Secondary Containment and Sump Characterization

The BGCAPP Main Plant RCRA secondary containment areas and associated sumps are located in the MDB, HSA, SPB, STA, SPB RO Heat Exchanger area, and WTS. These are summarized in Table C-4.

As discussed in Section C-1b, spent decontamination solutions from secondary containment cleanup and sumps in Category A, Category B, and Category C areas will be transferred to the SDS tanks, and these solutions will be used in MDB treatment operations (e.g., in the ANRs). With this preferred disposition path (use in MDB treatment operations), characterization of these solutions will not be required. However, in cases where these solutions are not needed in treatment operations, these will be verified to meet the release criteria (the lower of the WCL or DRE required agent hydrolysate concentration), with additional treatment performed in the SDS tanks as necessary to meet the release criteria, and either transferred to the HSS tanks or

shipped for off-site treatment and disposal. These options are reflected in Table C-1 and Table C-4 for spent decontamination solutions in Category A, Category B, and Category C areas.

Other liquids found in secondary containment areas or sumps in Category A, Category B, or Category C areas will be evaluated on a case-by-case basis guided by generation process knowledge. These may include:

1. Oils from equipment leaks as well as any other known organics (e.g., isopropyl alcohol used for sample line flushing) will be evaluated and if compatible sent to the SDS tanks for use in treatment operations along with the SDS solution; fluids incompatible with SDS solution will be characterized using applicable methods listed under organic wastes in Table C-1.
2. Large quantities of agent liquid from spills or leaks will be returned to the process for treatment through the SDS tanks and will not require characterization.
3. Large quantities of agent hydrolysate spills or leaks will be sent to the SDS tanks with spent decontamination fluids for treatment and will not require characterization as these will be reprocessed in the ANRs and the resulting ANR agent hydrolysate subsequently characterized.
4. Sodium hydroxide solution from leaks or spills will be sent to the SDS tanks with spent decontamination fluids and will not require characterization.

In the event an unknown liquid is discovered in a Category A, Category B, or Category C sump, an initial field screening will be performed visually for color and appearance of oil sheen and field pH and conductivity results obtained to aid in identification of the liquid, with further analyses as necessary performed using the methods in Table C-1 in order to support characterization for disposition (e.g., return to SDS tanks or off-site disposal).

Sumps in MDB Category D areas in the MDB, sumps in the HSA, sumps in the SPB, the SCWO heat exchanger sump, sumps in the STA, the Truck Loading Area sump, and the WTS tanker bays listed in Table C-4 will have the potential to contain liquids from leaks or spills. Rainwater may also be present in some MDB Category D area, HSA, SCWO heat exchanger, STA, Truck Loading Area, and WTS tanker bay sumps. An initial field screening will be conducted on liquids in these sumps consisting of:

1. Visual screening for oil sheens, indicating an oil or oil-based fluid spill or leak.
2. Visual screening for color and phases present, as agent hydrolysate, and blends are miscible with water and typically have a darker color.
3. Field pH, with high pH indicating agent hydrolysate, or caustic solution and low pH indicating acidic solutions.
4. Field conductivity, with high conductivities indicating presence of brine solutions (e.g., RO reject).

These field screening methods in conjunction with generation knowledge (e.g., heavy rainfall) will allow characterization of the liquids in these sumps. For cases where the field screening methods and generation knowledge are inconclusive, then additional characterization required to support disposition will be performed using the methods listed in Table C-1.

C-1m: On-site Waste Management - Containers

BGCAPP uses DOT-approved containers to store hazardous wastes in permitted container storage to meet the required container Level 1 control requirements of EPA air emissions

(Subpart CC)[3]. Containers are not equipped with pumps, compressors, pressure-relief devices, sampling connections, valves, flanges and connectors, or piping and are therefore not subject to Subpart BB requirements. Temporary storage of some hazardous wastes is likely to occur during operations (e.g., bagged agent-derived wastes or storage of liquid wastes in portable tanks). However, BGCAPP places hazardous wastes in DOT-approved waste containers before off-site transport. Per DOT requirements, the performance specifications for a specific container will be determined based on the waste characteristics, and wastes will only be stored in compatible containers with compatible liners (as applicable).

The container storage areas comply with the secondary containment requirements for storing containers with free liquids (i.e., through use of secondary containment areas, spill pallets, or other portable containment). Containers of agent-derived secondary wastes packaged for off-site shipment and treatment/disposal are headspace monitored and packaged to eliminate free liquids (e.g., by addition of adsorbent when containerized) prior to shipment.

The Part A identifies the waste streams managed/stored in containers (S01).

C-1n: Waste in Tank Systems

The BGCAPP waste storage tanks were fabricated from carbon steel or chemical-resistant alloys (e.g., Hastelloy® or stainless steel) which, through testing and use at other sites, have been shown to be compatible with agent hydrolysates, spent decontamination solutions, and brines (i.e., RO reject).

The HSA waste storage tanks will contain liquids that will be considered listed waste in accordance with 401 KAR 39:060 Section 3(4) [N301 or N302] and some D002 liquids. Secondary containment capable of containing the contents of the largest tank surrounds these waste tanks, as is provided for the process/storage tanks inside the MDB and SPB. However, because these storage tanks are located outdoors, the associated containments can also capture a 25-year/24-hour storm event and have adequate "freeboard" to prevent "topping" during or after this type of heavy rainfall event (i.e., sufficient freeboard to prevent topping if both of these events occur simultaneously).

Each treatment tank system inside the MDB (e.g., spent decontaminant system [SDS], agent neutralization system [ANS]) processes a single waste stream, eliminating the possibility of waste stream incompatibilities. In addition, the SDS, ANS, and Off-gas Treatment System Metal Parts Treater Condensate (OTMC) waste streams are also compatible and will not react with one another if these were to be released in the common secondary containment area. In addition, agent hydrolysate (GB or VX) is compatible with SDS and OTMC if these are combined in the SDS tanks or the HSA tanks.

Part A identifies the waste volumes treated or stored in tanks (T01 or S02).

C-2: Land Disposal Units [401 KAR 39:060 Section 4; 401 KAR 39:060, Section 5 & 40 CFR 124, 264, 268, and 270]

Wastes are not placed in land disposal units at the BGCAPP Facility; therefore, the requirements for this section are not applicable.

[3] Note that waste streams containing less than 500 ppm volatile organics are exempt per 40 CFR 264.1082 from the container requirements of 40 CFR 264.1086.

C-3: Land Treatment Units [401 KAR 39:060 Section 2, Section 3 and Section 5 & 40 CFR 124, 264, and 270]

Wastes will not be land treated at the BGCAPP Facility; therefore, the requirements for this section are not applicable.

C-4: Incinerators [401 KAR 39:060 Section 2, Section 3 and Section 5; 401 KAR 39:090 Section 1 & 40 CFR 124, 264, and 270]

Wastes will not be treated in incinerators at the BGCAPP Facility; therefore, the requirements for this section are not applicable.

C-5: Boilers and Industrial Furnaces [401 KAR 39:060 Section 2, Section 3 and Section 5; 401 39:090 Section 3; & 40 CFR 264 and CFR 266]

Wastes will not be treated in boilers or industrial furnaces at the BGCAPP Facility; therefore, the requirements for this section are not applicable.

C-6: Waste in Miscellaneous Treatment Units

The majority of the miscellaneous treatment units at BGCAPP provide for reverse assembly of and access to chemical agents in munitions. The demonstration of the effectiveness of these reverse assembly/treatment units is the capability to provide the required reverse assembly while maintaining the expected throughput rate. Laboratory analyses and operating parameters evaluated to determine the effectiveness of this treatment will include performance parameters such as that for the MPT, maintaining a temperature of at least 1,000°F and hold time of at least 15 minutes (i.e., the criteria established by the U.S. Army for thermal treatment of all chemical agents for safe release to the public).

C-7: Waste Analysis Plan [401 KAR 39:060, Section 5, 39:090, Section 1 & 40 CFR 124, 264, and 270]

Permitted tank treatment, tank storage, and container storage areas exist at BGCAPP. The hazardous waste storage units and waste streams are described in further detail in Part A.

BGCAPP uses knowledge of the processes generating the wastes to identify and characterize the wastes treated and stored in the permitted areas. The BGCAPP Laboratory will perform standard environmental analyses as well as agent-related analyses and headspace air monitoring of agent-contaminated materials, using U.S. Army methods, as required. Selected standard environmental analyses are expected to be performed off-site at subcontracted laboratories.

C-7a: Pre-Acceptance Phase [401 KAR 39:090 Section 1 & 40 CFR 264]

Not applicable. BGCAPP receives no wastes from off-site sources.

C-7b: Analysis of Wastes Received from Offsite Sources

Not applicable. BGCAPP receives no wastes from off-site sources.

C-7c: Waste Generated Onsite [401 KAR 39:060 Section 5, 39:090 Section 1, 40 CFR 124, 40 CFR 264, & 40 CFR 270]

C-7c(1): Sampling Methods

BGCAPP collects non-routine samples for analysis if waste characterization using process knowledge is not possible.

Table C-2 lists the specific equipment and/or methods used to obtain representative samples. For liquid wastes, EPA-approved sampling methods are used and sampling activities conform to SW-846 and/or American Society for Testing and Materials (ASTM) requirements, and are specified in the applicable standard and laboratory operating procedures (SOPs, LOPs).

C-7c(2): Frequency of Analysis

Analysis, testing, and monitoring, as applicable, of each waste stream will be performed as detailed in Table C-1. All agent hydrolysate is sampled, analyzed and confirmed to meet treatment standards prior to be transferred to the appropriate hydrolysate storage tank. This 100% confirmation that the regulatory treatment thresholds have been achieved provides the reassurance that the treatment process has been successfully accomplished before the hydrolysate leaves the controlled environment of the MDB. Waste streams that are not unique to the process such as dunnage, carbon and HEPA filters, spent decontamination solution and laboratory wastes are characterized and managed in accordance with SW-846 and/or ASTM guidance concerning sampling approach, methodology, representativeness and frequency. Sampling will be performed on the initial generated batches/drums (typically 3 to 4 samples) to adequately establish/confirm waste codes based on required waste characterization confidence levels (e.g., 90% one-sided upper confidence limit as described in SW-846). Once these baseline characterizations have been established, results will be confirmed through annual re analysis of representative batches/drums of the specific waste stream. Re analysis will also be performed if any of the following circumstances occur:

1. BGCAPP becomes aware of a change in the process in which waste is produced that impacts or changes the characteristics of that waste stream.
2. BGCAPP becomes aware a waste was inadvertently mixed with another waste.
3. BGCAPP determines through analysis a waste no longer matches the expected characteristics.
4. A hazardous waste regulation for a given waste is changed, causing a more restrictive requirement.

C-7c(3): Process Knowledge

BGCAPP personnel will use process (generator) knowledge to determine whether solid wastes such as PPE, components/parts, glassware, and disposable items are contaminated with chemical agent. The use of generator or process knowledge will be based on the following:

1. Data available from manufacture of similar items or subsequent characterizations performed by the U.S. Army;
2. Use of area agent monitoring, process instrumentation, spill history documentation, position/function, or other process data as a basis; or,

3. Other appropriate information or data that allows adequate characterization of the wastes.

Determination of waste characterization by process knowledge will be further defined within specific operating procedures.

C-7c(4): Analytical and Monitoring Methods

For each waste stream, Table C-1 provides the specific analytical, testing, and monitoring methods and techniques used to make waste determinations for each waste stream. Table C-2shows appropriate sampling equipment and methods for sampling and analysis of wastes based on the waste stream media. A general description of the headspace air monitoring approach for agent derived waste characterization is found in Section C-1a.

C-7d: Additional Requirements for Facilities Handling Ignitable, Reactive, or Incompatible Wastes

Ignitable wastes, when present, are stored and managed in a manner that prevents chemical reaction, fire, or explosion. To prevent actual ignition, these wastes are stored in areas away from sources of ignition that bear conspicuous placement of "No Smoking or Open Flames" signs. BGCAPP allows smoking only in designated areas and allows open flames only with a hot work permit.

BGCAPP stores reactive wastes in DOT containers and places the containers containing liquids on a containment pallet and separates the containers with solids by an appropriate distance within a RCRA hazardous waste storage area (permitted or <90-day area) with conspicuous placement of "No Smoking" signs. Incompatible wastes can be managed similarly but are not expected to be present in the permitted storage area.

C-7e: Additional Requirements Pertaining to Boiler/Industrial Furnace Facilities

Not applicable. BGCAPP does not use boilers or industrial furnaces for waste treatment.

C-7e(1): Additional Requirements for Wastes Generated Offsite

Not applicable. BGCAPP does not accept for treatment or storage any hazardous wastes that originate off site (i.e., outside the facility boundaries of BGAD).

C-7e(2): Applicability of Treatment Standards

Not applicable. BGCAPP does not accept off-site wastes and does not perform land disposal.

C-8: Additional Waste Analysis Requirements Pertaining to Land Disposal Restrictions [401 KAR 39:060, Section 4 & Section 5, 39:090 Section 1 & Section 3, & 40 CFR 124, 264, 268, and 270]

BGCAPP both generates and stores wastes subject to LDRs. However, BGCAPP does not treat wastes to meet LDR standards; therefore, a WAP for LDR waste determinations in the permitted storage areas is not required. While BGCAPP does treat agent, the chemical agents are not

subject to LDRs. Treated waste (e.g., MPT residues, RO reject) and secondary wastes sent off-site to a TSDF will be characterized by the TSDF as necessary to support LDR disposal requirements.

For non-agent-containing waste streams to be disposed, BGCAPP uses generator knowledge to determine whether LDRs apply as well as performs analyses to confirm which LDRs apply and provides this information to the TSDF facilities to which the wastes are shipped.

The information contained in this section includes the methods for determining LDR applicability, compliance with LDR treatment standards, and notification and certification requirements. Appropriately permitted, commercial TSDFs provide any additional, required treatment to achieve LDR treatment standards.

BGCAPP generates listed wastes and spent solvent wastes while also generating characteristic wastes, lab pack wastes, and waste mixtures with overlapping requirements. Waste streams are stored in the permitted and <90 day storage units. As part of the initial waste characterization program, BGCAPP determines RCRA waste codes and applicable underlying hazardous constituents; this information is provided to TSDFs to which wastes are shipped. Appropriately permitted, commercial TSDFs provide any required treatment to achieve LDR treatment standards. BGCAPP does not expect to generate dioxin wastes, radioactive mixed wastes, or leachates.

BGCAPP retains on site copies of all notifications, certifications, demonstrations, and other documentation produced to support the determination for restricted waste treated, stored, or disposed of at an appropriately permitted, commercial TSDF.

Retention, in BGCAPP files, of notifications, certifications, supporting data, and waste analysis data is for a period of at least 3 years.

C-8a: Waste Characteristics [401 KAR 39:060 Section 4, and 39:090 Section 1 & 40 CFR 264 and 40 CFR 268]

C-8a(1): Waste Characteristics: Solvent Wastes and Dioxin Containing Wastes [401 KAR 39:060, Section 4; 401 KAR 39:090, Section 1 & 40 CFR 264, and 40 CFR 268]

BGCAPP does not ship F001, F002, F003, F004, and F005 solvents off-site for land disposal and uses generator knowledge and/or analytical testing to determine whether BGCAPP processes generate dioxin-containing, restricted wastes. Operating records include the generator knowledge and/or analytical results used to make restricted waste determinations.

C-8a(2): Prohibitions: Dilution as a Substitute for Treatment

Not applicable. BGCAPP does not treat wastes or treatment residues restricted from land disposal by dilution.

C-8a(3): Wastes That Are Prohibited From Combustion

Not applicable. BGCAPP does not employ combustion as a treatment process.

C-8a(4): Dilution Prohibitions for Lead Containing Wastes

Lead-containing hazardous wastes do not have iron filings or other metallic iron added to achieve any LDR treatment standard; therefore, no LDR requirements will be instituted for iron filings or other metallic iron.

C-8a(5): Waste Specific Prohibitions: Wood-Preserving Wastes

Not applicable. BGCAPP does not treat or generate F032, F034, or F035 wood preserving wastes.

C-8a(6): Waste Characteristics – California List Wastes [401 KAR 39:060 Section 4, & 40 CFR 268]

The SFTs containing VX or GB rockets contain PCBs. The U.S. Army has agreed with the EPA these items contain, on average, 1,247 ppm of PCBs. The source or nature of the contamination on/in these solid items (i.e., SFTs) is discussed in 24915-00-GPE-GGPT-00084, Request for Approval to Treat, Store and Dispose of PCB Wastes, submitted to EPA Region IV. As discussed in this request, BGCAPP will not generate liquid wastes with concentrations above 50 ppm PCBs. Wastes generated as a result of the management of SFTs will be characterized based on generator knowledge indicated above.

In addition, there is potential for generation of laboratory liquid wastes (e.g., acid digestion fluids) with pH <2.0. Based on generator knowledge, BGCAPP does not routinely treat or generate other wastes within this list, including the following:

1. Liquid wastes containing PCBs at concentrations >50 ppm
2. Liquid hazardous wastes that are primarily water and contain halogenated organic compounds (HOCs) in total concentrations ≥1,000 mg/L
3. Non liquid hazardous wastes that contain HOCs in total concentrations ≥1,000 milligrams/kilogram (mg/kg)

C-8a(7): Additional Requirements for Disposal Facilities

Not applicable. BGCAPP receives no off-site wastes and is not a disposal facility.

C-8a(8): Additional Requirements for Surface Impoundments Exempted from Land Restrictions

Not applicable. BGCAPP does not include any surface impoundments.

C-8a(9): Requirements for Land Disposal Facilities with an Approved Exemption or Extension

Not applicable. BGCAPP does not include any land disposal facilities and does not have an approved exemption or extension.

C-8b: Use of Total Constituent Analysis Instead of Toxicity Characteristic Leaching Procedure (TCLP)

Under certain conditions, BGCAPP will use total constituent analysis instead of TCLP analysis. This is commonly referred to as the "Rule of 20" and will only be used for solid wastes.

Section 1.2 of the TCLP does allow for a total constituent analysis in lieu of the TCLP extraction. If a waste is 100 percent solid as defined by the TCLP method, then the results of the total constituent analysis is divided by 20 to convert the total results into the maximum leachable concentration. This factor is derived from the 20:1 liquid to solid ratio employed in the TCLP. If a waste has filterable liquid, then the concentration of the analyte in each phase (liquid and solid) must be determined. The following equation is used to calculate this value:

$$\frac{[A \times B] + [C \times D]}{B + [20\ (L/kg) \times D]} = E$$

Where: A = Concentration of the analyte in liquid portion of the sample (mg/L)

B = Volume of the liquid portion of the sample (liters [L])

C = Concentration of the analyte in solid portion of the sample (mg/kg)

D = Weight of the solid portion of the sample (kilograms [kg])

E = Maximum theoretical concentration in leachate (mg/L)

The value obtained in (E) can be used to show the maximum theoretical concentration in a leachate from the waste could not exceed the concentration specified in the toxicity characteristic (TC) (40 CFR 261.24).

In addition, if the total constituent analysis results themselves are below the TC limits without dividing by 20, then the same argument holds true (i.e., the maximum theoretical concentration in the leachate could not exceed the TC limits).

Table C-1: BGCAPP Waste Analysis Plan (WAP) Summary

Wastes Requiring Characterization	Method of Treatment or Disposal	Type of Analysis ‡	Analytical Method/ Clearance Criteria (as Applicable)	Frequency of Analysis	Regulatory Requirement
Munition residues (particulates ash, other residues) D004, D005, D006, D007, D008, D009, D010, D011, N201, and/or N202	MPT / off-site shipment	TCLP metals	EPA SW-846 Method 1311, 3015, 6020 / 7470 [a]	During initial waste generation and when process changes, then annually	401 KAR 39:060, Section 3; 40 CFR 261.24
Contaminated dunnage (PPE, trash, rags, O&M activities, pallets) D026, D037, N001, and/or N002	BGCAPP decontamination procedures / MPT / off-site shipment	TCLP metals GB and VX agent headspace monitoring Cresols, Pentachlorophenol	EPA SW-846 Method 1311, 3015, 6020 / 7470 [a] Threshold limits established by the BTRA EPA SW-846 Method 1311, 3510, 3580, 8041 [a] or Generator Knowledge	During initial waste generation and when process changes, then annually; VX or GB agent headspace monitoring for each batch or container	401 KAR 39:060, Section 3; 40 CFR 261.24 24915-00-9PL-00-00001, Laboratory Analysis and Monitoring Plan (CDRL D007); BTRA[b]; 401 KAR 39:060 Section 3; 40 CFR 261.3(a)(2)(iv) and (c)(2)(i) 401 KAR 39:060, Section 3; 40 CFR 261.24
Munition dunnage (non-contaminated pallets, etc.) D026 and/or D037	Off-site shipment	Cresols, Pentachlorophenol	EPA SW-846 Method 1311, 3510, 3580, 8041 [a] or Generator Knowledge	During initial waste generation	401 KAR 39:060, Section 3; 40 CFR 261.24
Carbon, PRE/HEPA filters N001, N002, and/or D022	Off-site shipment	Generator Knowledge	MINICAMS® (with DAAMS confirmation of detects)	NRT	401 KAR 39:060, Section 3; 40 CFR 261.3(a)(2)(iv) and (c)(2)(i)
Agent hydrolysates D002, D004, D005, D006, D007, D008, D009, D010, D011, N301, N302, N801, N802, N901, and/or N902	Off-site shipment	Agent screen (GB and VX) Flash Point (TCLP Organics (VOA, SVOA) Total Metals	Concentration equivalence of 99.9999% agent destruction in process (GB) and USAPHC WCL (VX) by site-specific extraction/analytical methods ASTM method D8175-18A EPA SW-846 Methods 1311, 5030, 8260, 8270 [a] EPA SW-846 Method 6020, 7470 or Generator Knowledge	Before disposal During initial waste generation and when process changes, then annually During initial waste generation and when process changes, then annually During initial waste generation and when process changes, then annually	24915-00-9PL-00-00001, Laboratory Analysis and Monitoring Plan (CDRL D007); 401 KAR 39:060 Section 3; 40 CFR 261.3(a)(2)(iv) and (c)(2)(i) 401 KAR 39:060, Section 3; 40 CFR 261.21 401 KAR 39:060, Section 3; 40 CFR 261.24, 261.31 401 KAR 39:060, Section 3; 40 CFR 261.24

Wastes Requiring Characterization	Method of Treatment or Disposal	Type of Analysis ‡	Analytical Method/ Clearance Criteria (as Applicable)	Frequency of Analysis	Regulatory Requirement
Spent decontamination solution [e] D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, N01, N302, N801, N802, N901 and/or N902	ANR / BGCAPP decontamination procedures / off-site shipment	Agent screen (GB and VX) [c]	Generator knowledge, concentration equivalence of 99.9999% agent destruction in process (GB) and USAPHC WCL (VX) (ANR treatment only), site-specific extraction/analytical methods (off-site shipment)	As necessary	24915-00-9PL-00-00001, Laboratory Analysis and Monitoring Plan (CDRL D007); USAPHC[b] ; 401 KAR 39:060Section 3; 40 CFR 261.3(a)(2)(iv) and (c)(2)(i)
Laboratory wastes [d] D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D022, D024, D026, D027, D028, D029, D035, D037, D038, D039, F001-F005, P098, P106, U002, U003, U044, U080, U154, U188, U196, U213, and/or N001, N002, N101, N102, N201, N202, N301, N302, N701, and/or N702	BGCAPP decontamination procedures / off-site shipment	Ignitability Corrosivity (pH) Reactivity TCLP metals Organics Cresols, Pentachlorophenol (phenols) Agent screen (GB and VX) - liquids GB and VX agent headspace monitoring - solids	EPA SW-846 Method 1010 [a] EPA SW-846 Methods 9040, 9041, 9045 [a] Generator knowledge EPA SW-846 Method 1311, 3015, 6020 / 7470 [a] EPA SW-846 Methods 1311, 5030, 8260, 8270 [a] EPA SW-846 Method 1311, 3510, 3580, 8041 [a] Site-specific extraction/analytical methods Generator knowledge, threshold limits established by the BTRA	During initial waste generation and when process changes, then annually; agent screen at frequency required to clear each waste batch for off-site shipment	401 KAR 39:060, Section 3; 40 CFR 261.21 401 KAR 39:060, Section 3; 40 CFR 261.22 401 KAR 39:060, Section 3; 40 CFR 261.23 401 KAR 39:060, Section 3; 40 CFR 261.24 401 KAR 39:060, Section 3 40 CFR 261.24, 261.31 401 KAR 39:060, Section 3; 40 CFR 261.24 24915-00-9PL-00-00001, Laboratory Analysis and Monitoring Plan (CDRL D007); USAPHC [b]; 401 KAR 39:060 Section 3; 40 CFR 261.3(a)(2)(iv) and (c)(2)(i) 401 KAR 39:060 Section 3; 40 CFR 261.3(a)(2)(iv) and (c)(2)(i); BTRA [b]

Wastes Requiring Characterization	Method of Treatment or Disposal	Type of Analysis ǂ	Analytical Method/ Clearance Criteria (as Applicable)	Frequency of Analysis	Regulatory Requirement
Organic wastes (oils, hydraulic fluids, paints, solvents) and other potentially agent contaminated and non-agent contaminated wastes D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, F001-F005, and/or N001, N002, N101, N102, N201, N202, N301, N302, N701, and/or N702	BGCAPP decontamination procedures / off-site shipment	Ignitability Corrosivity (pH) Reactivity TCLP metals Organics Cresols, Pentachlorophenol (phenols) Agent screen (GB and VX) - liquids GB and VX agent headspace monitoring - solids	EPA SW-846 Method 1010 [a] EPA SW-846 Methods 9040, 9041, 9045 [a] Generator Knowledge EPA SW-846 Method 1311, 3015, 6020 / 7470 [a] EPA SW-846 Methods 1311, 5030, 8260, 8270 [a] EPA SW-846 Method 1311, 3510, 3580, 8041 [a] Site-specific extraction/analytical methods Generator knowledge, threshold limits established by the BTRA	Before disposal	401 KAR 39:060, Section 3; 40 CFR 261.21 401 KAR 39:060, Section 3; 40 CFR 261.22 401 KAR 39:060, Section 3; 40 CFR 261.23 401 KAR 39:060, Section 3; 40 CFR 261.24 401 KAR 39:060, Section 3 40 CFR 261.24, 261.31 401 KAR 39:060, Section 3; 40 CFR 261.24 24915-00-9PL-00-00001, Laboratory Analysis and Monitoring Plan (CDRL D007); USAPHC [b] ; 401 KAR 39:060 Section 3; 40 CFR 261.3(a)(2)(iv) and (c)(2)(i) 401 KAR 39:060 Section 3; 40 CFR 261.3(a)(2)(iv) and (c)(2)(i); BTRA [b]
OTM condensate (liquid)[e] D002, N801, N802, N901, and/or, N902	BGCAPP decontamination procedures / off-site shipment	TCLP metals Agent screen (GB and VX)	EPA SW-846 Method 1311, 3015, 6020 / 7470 [a] Generator knowledge, concentration equivalence of 99.9999% agent destruction in process (GB) and USAPHC WCL (VX), Site-specific extraction/analytical methods	During initial waste generation if shipment off-site required; agent screen at frequency required to clear each waste batch for off-site shipment	401 KAR 39:060, Section 3; 40 CFR 261.24 24915-00-9PL-00-00001, Laboratory Analysis and Monitoring Plan (CDRL D007); USAPHC [b] ; 401 KAR 39:060 Section 3; 40 CFR 261.3(a)(2)(iv) and (c)(2)(i)
RMs / SFTs D001, D003, D008, and/or, N102, N101	Off-site shipment	GB and VX agent headspace monitoring	Generator knowledge, threshold limits established by the BTRA	Each filled shipment container	401 KAR 39:060 Section 3; 40 CFR 261.3(a)(2)(iv) and (c)(2)(i)

ǂ Note that these represent all potential characterization requirements for a waste stream or its components; however, some parameters will not apply in cases where a particular waste stream or waste stream component can be characterized by generator knowledge or previous sampling and analysis results.

[a] These are suggested EPA SW-846 methods as referenced in 401 KAR 39:060 Section 2 (referencing 40 CFR. 260.11); the actual method used for any particular analysis will depend upon factors such as previous generator knowledge, off-site laboratory recommendations, and the specific matrix and application; see Table C-6 for potential alternative analytical methods to those listed for each waste stream. Note that not all listed analytical methods will be used for a waste stream if generator knowledge is sufficient for characterization of the parameter of interest.

[b] Based on Bounding Transportation Risk Assessment levels or US Army Public Health Command (USAPHC) Chemical Agent Health-Based Standards and Guidelines Summary (July 2011).

[c] Not required if treated in ANRs; additional analyses for SDS will be performed using applicable methods listed under laboratory wastes as applicable to disposal method if shipped off-site.

[d] Analyses performed on wastes as applicable based on waste matrix and disposal method if necessary to ship off-site.

[e] OTM Condensate potentially mixed with SDS in the HSS tanks prior to shipment.

Table C-2: Waste Sampling Methods and Equipment

Description of Material to be Sampled	Sampling Method[1, 2]	Equipment[1]
Extremely viscous liquid	ASTM standard D140/D140-09	Tubing or trier
Crushed or powdered material	ASTM standard D346-04	Tubing, trier, auger, scoop, or shovel
Solid or rock-like material	ASTM standard D420-98	Tubing, trier, auger, scoop, or shovel
Solid or rock-like material	ASTM standards D1452-09, D5633-04 (and D5451-93)	Tubing, trier, auger, scoop, or shovel
Ash-like material	ASTM standard C311-07	Tubing, trier, auger, scoop, or shovel
Containerized liquid	SW-846	COLIWASA, tubing
Waste tank liquids	Tap	Sampling bottle

[1] The equipment items listed here are suggestions; actual equipment used at the BGCAPP facility will be as outlined by 24915-00-9PL-00-00001, Laboratory Analysis and Monitoring Plan (CDRL D007) or individual LOPs. The methods specified will ensure representative samples are obtained for analysis.

[2] American Society for Testing and Materials, annual book of ASTM standards, Volumes 04-03, 04-08, 05-05, Philadelphia, PA.

Table C-3: Composition of Agents GB and VX, Energetics, and Propellant: BGCAPP Design Criteria

Composition	GB (%)	VX (%)
O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate (VX)		92.7094
Isopropyl methylphosphonofluoridate (GB)	80.2427	
Diisopropylamine (DIPA)		0.1600
Diisopropylcarbodiimide (DICDI)		0.3000
Dicyclohexylcarbodiimide (DCCDI)		1.6000
Diisopropylaminoethanethiol (RSH)		0.7000
1,3-diisopropylurea (DIPU)	1.7549	0.3000
Pyrodiester [Diethyl dimethylpyrophosphonate] ((CH3CH2O)(CH3)P(O))2O		1.5000
Diisopropyl methylphosphonate (DIMP)	11.2197	
Hydrofluoric acid	0.2217	
Isopropyl fluoride	0.0297	
Tributylamine (TBA)	2.26831	
Chloroform	0.0693	
Isopropyl alcohol	0.4752	
Isopropyl methylphosphonic acid (IMPA)	0.5370	

Composition	GB (%)	VX (%)
Bis(2-diisopropylaminoethyl) disulfide (RSSR)		0.7000
Other Organics	2.2766	2.2700
Aluminum		0.000183
Nickel		0.00000135
Copper		0.0000578
Iron		0.0024
Calcium		0.0154
Silicon		0.01253
Other Metals		0.0000375
Total	100.000	100.000

Source: VX: Analysis of the VX agent from the Newport Chemical Agent Disposal Facility (NECDF)

GB: Analysis of the GB agent from the Anniston Chemical Agent Disposal Facility (ANCDF)

Energetics

Energetics in GB and VX rocket warheads consist of Composition B (60% RDX [cyclotrimethylenetrinitramine], 39% TNT [2,4,6-trinitrotoluene], and 1% wax) or tetrytol (70% tetryl [2,4,6-trinitrophenylmethylnitramine] and 30% TNT) and RDX.

Propellant

Rocket motor propellant, M28, to be processed as part of the leaker campaign, consists of 60% nitrocellulose, 23.8% nitroglycerin, 9.9% triacetin, 2.6% diethylphthalate, 2.0% lead stearate, and 1.7% nitrodiphenylamine.

Table C-4: RCRA Secondary Containment and Sump Liquid Characterization

Building or Area	Room or Area	Area Category	Type of Storage Area	Wastes Stored in Containment Area	Containment Area Liquid Potentially Requiring Characterization	Characterization
MDB	Agent Neutralization System Tanks and Storage Area (Room 07-123)	Category A	Containers; Agent Holding Tank MT-ACS-0105, Agent Surge Tank MT-ACS-0106; Agent Neutralization Reactor (ANR) Tanks MV-ANS-0101 and MV-ANS-0201; Spent Decontamination System (SDS) Tanks MV-SDS-0101, MV-SDS-0201, and MV-SDS-0301; sumps SDS-0148 and SDS-0149	Secondary wastes, SDS contingency storage, VX or GB agent; VX or GB agent hydrolysate	SDS solution, agent leak or spill, agent hydrolysate leak or spill, oils from equipment leaks, sodium hydroxide solution leak or spill	SDS solutions to be treated in process: -none SDS solutions sent to HSS tanks or shipped off-site: -agent analysis to verify meets agent release criteria[1] and other applicable requirements in Table C-1 Oils, hydraulic fluids, paints, other organics - cases-by-case analyses using methods listed in Table C-1 Agent spills or leaks (large quantity) - returned to treatment process - further characterization not required Agent hydrolysate or leaks (large quantity) - sent to SDS tanks - further characterization not required Sodium hydroxide spills or leaks (large quantity) - sent to SDS tanks - further characterization not required
MDB	Airlock (Room 07-109)	Category A	Airlock, sump SDS-0151	None	SDS solution	
MDB	Airlock (Room 07-132)	Category A	Airlock, sump SDS-0175	None	SDS solution	
MDB	Airlock (Room 07-136)	Category A	Airlock, sump SDS-0174	None	SDS solution	
MDB	DPE Corridor (Room 07-120)	Category A	DPE Corridor, sump SDS-0147	None	SDS solution	
MDB	Energetics Batch Hydrolyzer Area (Room 07-111)	Category A	Energetics Batch Hydrolyzer (EBH)area ; sump SDS-0136	Munitions and secondary wastes	SDS solution	
MDB	Explosive Containment Room (ECR) and Storage Area No. 1, ECR-1 (Room 07-104)	Category A	Containers; RHS Miscellaneous Unit (RSM MY-RHS-0101); sump SDS-0131	Munitions and secondary wastes	SDS solution	

Building or Area	Room or Area	Area Category	Type of Storage Area	Wastes Stored in Containment Area	Containment Area Liquid Potentially Requiring Characterization	Characterization
MDB	Explosive Containment Room (ECR) and Storage Area No. 2, ECR-2 (Room 07-105)	Category A	Containers; RHS Miscellaneous Unit (RSM MY-RHS-0102); sump SDS-0134	Munitions and secondary wastes	SDS solution	
MDB	Munition Washout System Area (Room 07-135)	Category A	Containers (MWS Reject Table – MJ-MWS-0103); MWS Miscellaneous Units MY-NCR-0101, MZ-MWS-0101A- MZ-MWS-0101E; sump SDS-0141	Munitions and secondary wastes	SDS solution	
MDB	Explosive Containment Vestibule (ECV) and Storage Area, ECV-1 (Room 07-103)	Category A/B	Containers; RHS Miscellaneous Unit; sump SDS-0152	Munitions and secondary wastes	SDS solution	
MDB	Explosive Containment Vestibule (ECV) Storage Area, ECV-2 (Room 07-106)	Category A/B	Containers; RHS Miscellaneous Unit; sump SDS-0138	Munitions and secondary wastes	SDS solution	
MDB	Toxic Maintenance Area (TMA) (Room 07-125)	Category A/B	Containers; sumps SDS-0143, SDS-0144, and SDS-0145	Secondary wastes, munitions	SDS solution	
MDB	Airlock (Room 07-107)	Category B	Airlock, sump SDS-0135	None	SDS solution	
MDB	Airlock (Room 07-126)	Category B	Airlock, sump SDS-0167	None	SDS solution	
MDB	Airlock (Room 07-142)	Category B	Airlock, sump SDS-0184	None	SDS solution	
MDB	Airlock (Room 07-162)	Category B	Airlock, sump SDS-0228	None	SDS solution	

Building or Area	Room or Area	Area Category	Type of Storage Area	Wastes Stored in Containment Area	Containment Area Liquid Potentially Requiring Characterization	Characterization
MDB	EBH Support Room (Room 07-113)	Category B	sump SDS-0201	None	SDS solution	
MDB	Energetics Neutralization System Area (Room 07-119)	Category B	Energetics Neutralization Reactor (ENR) area, sump SDS-0165, sump SDS-0166	None	SDS solution	
MDB	Metal Parts Treater Area (Room 07-146)	Category B	Metal Parts Treaters ME-MPT-0101, ME-MPT-0201, sump SDS-0173, sump SDS-0235	Drained munitions, secondary wastes	SDS solution	
MDB	Motor Packing Room (MPR) Storage Area (Room 07-163)	Category B	Containers, sump SDS-0182	Rocket Motors and SFTs	SDS solution	
MDB	Toxic Maintenance Area (TMA) Equipment Room (Room 07-133)	Category B	Sump SDS-0177	Secondary wastes, munitions	SDS solution	
MDB	Tray/Container Transfer Room (Room 07-124)	Category B	Containers, sump SDS-0170, sump SDS-0171, sump SDS-0178	Secondary wastes	SDS solution	
MDB	Box Transfer Area, Room 1 (Room 07-165)	Category C	Containers	Rocket Motors	None	Not applicable
MDB	Box Transfer Area, Room 2 (Room 07-166	Category C	Containers	Rocket Motors	None	Not applicable
MDB	EBH Support Area (Room 07-203)	Category C	Sump SDS-0227	None	Equipment or system leaks, spills	SDS solutions to be treated in process:

Building or Area	Room or Area	Area Category	Type of Storage Area	Wastes Stored in Containment Area	Containment Area Liquid Potentially Requiring Characterization	Characterization
MDB	EBH/ENS/MPT Off-gas Treatment Area (Room 07-140)	Category C	Sump SDS-0229, sump SDS-0230, sump SDS-0231, sump SDS-0232, sump SDS-0233	None	Equipment or system leaks, spills	-none SDS solutions sent to HSS tanks or shipped off-site: -agent analysis to verify meets release criteria[1] and other applicable requirements in Table C-1 Oils, hydraulic fluids, paints, other organics - cases-by-case analyses using methods listed in Table C-1 Agent spills or leaks (large quantity) - returned to treatment process - further characterization not required Agent hydrolysate spills or leaks (large quantity) - sent to SDS tanks - further characterization not required Sodium hydroxide spills or leaks (large quantity) - sent to SDS tanks - further characterization not required
MDB	ENS/ANS Sampling Glovebox Room (Room 07-121)	Category C	Sump SDS-0198	None	Equipment or system leaks, spills	
MDB	EONC Leaker Airlock (Room 07-102)	Category C	Sump SDS-0202	None	Equipment or system leaks, spills	
MDB	Observation Corridor (Room 07-117)	Category C	Corridor, sump SDS-0200	None	Equipment or system leaks, spills	
MDB	Observation Corridor (Room 07-137)	Category C	Corridor, sump SDS-0154	None	Equipment or system leaks, spills	
MDB	Observation Corridor (Room 07-144)	Category C	Corridor, sump SDS-0168	None	Equipment or system leaks, spills	
MDB	Secondary Heat Transfer Room (Room 07-118)	Category C	Sump SDS-0169, sump SDS-0220	None	Equipment or system leaks, spills	
MDB	Transfer Area (Room 07-129)	Category C	Sump SDS-0176	None	Equipment or system leaks, spills	
MDB	Unpack Area (UPA) No. 1, UPA-1 (Room 07-101)	Category C	Containers, sump SDS-0190, sump SDS-0191	Munitions and secondary wastes	Equipment or system leaks, spills	
MDB	Unpack Area (UPA) No. 2, UPA-2 (Room 07-128)	Category C	Containers, sump SDS-0222, sump SDS-0223	Munitions and secondary wastes	Equipment or system leaks, spills	
MDB	UPA Equipment Room (Room 07-134)	Category C	Sump SDS-0185	None	Equipment or system leaks, spills	

Building or Area	Room or Area	Area Category	Type of Storage Area	Wastes Stored in Containment Area	Containment Area Liquid Potentially Requiring Characterization	Characterization
MDB	Washout/MPT Support Room (Room 07-148)	Category C	Sump SDS-0180, sump SDS-0181	None	Equipment or system leaks, spills	
MDB	Metal Parts Treater (MPT) Cooling Conveyor Storage Area (Room 07-150)	Category D	Containers, sump NCD-0235, sump NCD-0236	MPT treated metal for recycle; MPT treated secondary waste; spent particulate filter cartridges	Secondary waste spill cleanup, deluge water,	Field screen for -oil sheen or water discoloration -pH -conductivity Table C-1 based on waste type and disposal facility requirements, if additional analyses required for characterization
MDB	Motor Shipping Room (MSR) / Covered Loading Area (Room 07-164 / Area 07-168)	Category D	Containers, sump NCD-0233	Rocket Motors and SFTs	Rainwater	
MDB	OTM Area (Room 07-141)	Category D	Sump NCD-0230, sump NCD-0231, sump NCD-0232	None	Equipment or system leaks, spills, rainwater	
HSA	HSA	NA	Agent Hydrolysate HSA Tanks MT-HSS-0105, MT-HSS-0205, sump HSS	Agent hydrolysate, SDS, OTMC	Rainwater; tank or system leak	Field screen for -oil sheen or water discoloration -pH -conductivity Table C-1 based on waste type and disposal facility requirements, if additional analyses required for characterization
HSA	HSA	NA	Energetics Hydrolysate HSA Tanks MT-HSS-0604, MT-HSS-0704, sump HSS	OTMC, SDS	Rainwater; tank or system leak	

Building or Area	Room or Area	Area Category	Type of Storage Area	Wastes Stored in Containment Area	Containment Area Liquid Potentially Requiring Characterization	Characterization
SPB	Area 10-01	NA	Chemical storage tanks, sump SCWO-01, sump SCWO-02	Isopropyl alcohol	Tank or system leak	Table C-1 based on waste type and disposal facility requirements, if additional analyses required for characterization
Truck Loading Area	Area 10-17	NA	Sump Truck Load	Agent hydrolysate, SDS, OTMC	Tanker leak	Field screen for -oil sheen or water discoloration -pH -conductivity Table C-1 based on waste type and disposal facility requirements, if additional analyses required for characterization
WTS	WTS Areas using Spill Pallets	NA	Containers	Miscellaneous waste	Container leak to spill pallet containment	Table C-1 based on waste type and disposal facility requirements
WTS	Tanker Bays		Containers (tankers)	Agent hydrolysate, SDS, OTMC	Rainwater; potential leaks from tanker or trucks/trailers (oil, diesel, other fluids)	Field screen for -oil sheen or water discoloration -pH -conductivity Table C-1 based on waste type and disposal facility requirements, if additional analyses required for characterization

[1]the lower of the USAPHC WCL or DRE required agent hydrolysate concentration

Table C-5: Major Waste Streams with Approximate Compositions

Chemical Name	Formula or Abbrev.	ACS Tank (Drained VX), wt.%
O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate	VX	93
Other Organics	ORGANICS	2.27
Dicyclohexylcarbodiimide	DCCDI	1.60
Pyrodiester [Diethyl dimethylpyrophosphonate] ((CH3CH2O)(CH3)P(O))2O	PYRO	1.50
Diisopropylcarbodiimide	DICDI	0.30
Diisopropylamine	DIPA	0.15
1,3-diisopropylurea	DIPU	0.43
Water	H20	1.69E-15
Nitrogen	N2	0.11
Oxygen	O2	5.42E-5
Bis(2-diisopropylaminoethyl) disulfide	RSSR	0.70
Diisopropylaminoethanethiol	R-SH	0.43

Chemical Name	Formula or Abbrev.	VX Agent Hydrolysate in HSS Tanks, wt.%
Sodium methylphosphonate	MPA-NA2	0.81
Water	H20	75.72
Sodium diisopropylaminoethanethiol	RSNA	10.56
Sodium ethyl methylphosphonate	EMPA-NA	7.89
Sodium Hydroxide	NaOH	3.80
Ethanol	C2H6O	0.26
Dicyclohexylcarbodiimide	DCCDI	0.26
Diisopropylcarbodiimide	DICDI	0.05
Diisopropylamine	DIPA	0.02
1,3-diisopropylurea	DIPU	0.05
Bis(2-diisopropylaminoethyl) disulfide	RSSR	0.23
Nitrogen	N2	0.007
Other Organics	ORGANICS	0.377
Soap	SOAP	0.008

Chemical Name	Formula or Abbrev.	ACS Tank (Drained GB), wt%
		wt%
Isopropyl Methylphosphonofluoridate	GB	80.19
Diisopropyl methylphosphonate	DIMP	11.22
Other Organics	ORGANICS	2.77
Tributylamine	TBA	2.68
1,3-diisopropylurea	DIPU	1.75
Isopropyl methylphosphonic Acid	IMPA	0.54
Isopropyl Alcohol	C3H8O	0.47
Hydrogen Fluoride	HF	0.18
Nitrogen	N2	0.10
Chloroform	CHCl3	0.07
Isopropyl Fluoride	C3H7F	0.03

Chemical Name	Formula or Abbrev.	GB Agent Hydrolysate in HSS Tanks, wt%
Water	H2O	87.69
Sodium Isopropyl Methylphosphonate	IMPANA	7.63
Sodium Hydroxide	NaOH	1.93
Sodium Fluoride	NaF	1.83
Isopropyl Alcohol	C3H8O	0.32
Other Organics	ORGANICS	0.21
Tributylamine	TBA	0.20
1,3-diisopropylurea	DIPU	0.13
Isopropyl methylphosphonic Acid	IMPA	0.04
Chloroform	CHCl3	4.9E-03
Isopropyl Fluoride	C3H7F	2.2E-03
Nitrogen	N2	1.1E-03
Oxygen	O2	3.1E-10

Table C-6: Additional Analytical Methods

Analyses	Additional Methods
TCLP metals	EPA SW-846 Methods 6010, 7471, EPA Method 200.8
Organics	EPA SW-846 Methods 8015, 8081, 8082, 8091, 8095, 8330, 8332, 8510, 8515
Cresols, Pentachlorophenol (phenols)	EPA SW-846 Method 8540
Cyanides	EPA SW-846 Methods 9012, EPA Method 335.4
pH	EPA Method 150.2
Residual Explosives	Bureau of Explosives Impact Test, UN Test Manual, Test 3(a)(i), Test 3(a)(iv) Army Procedure TB700-2, Section 5-3b MIL-STD 1751A, Methods 1011 and 1014

Appendix C-1: Bounding Transportation Risk Assessment and USAPHC Table

Appendix C-2: Laboratory Analysis and Monitoring Plan (LAMP)

Appendix C-3: Metal Parts Treater Monitoring Plan