ATTACHMENT 3

WASTE ANALYSIS PLAN
FOR RESIDUE AND ASH

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WASTE ANALYSIS PLAN FOR RESIDUE AND ASH

1.0 Introduction

This waste analysis plan (WAP) provides guidance for the sampling and analysis activities of residue and ash for the permitted operation of the TTU sites under the State of Utah issued Hazardous Waste Operating Permit (EPA I.D. UT0570090001). This plan will be kept at the UTTR Environmental Management Office at Oasis.

The WAP was developed to ensure that all waste streams treated or generated at the TTU are properly characterized and managed (i.e., that the hazardous constituents they contain or may release through thermal treatment are sufficiently identified). Because the nature of military munitions does not allow the reactive filler or components to be analyzed prior to treatment, generator knowledge of the waste munitions constituents and characteristics is used in place of standard waste stream sampling. Residues generated from treatment of reactive wastes at the TTU may be characterized via visual inspection, testing, or generator knowledge.

2.0 UTTR-North TTU Description

2.1 Site History

The TTU has been operating for more than 30 years. During that time it has treated solid propellant energetic pyrotechnics (PEP) items using both open burning (OB) and open detonation (OD) thermal treatment processes.

2.2 Site Description

The TTU occupies approximately 2 square miles in a gently southwestward sloping valley. This area is located approximately 5 miles northeast of the UTTR-North range support facility (Oasis) and 20 miles north of Utah Exit 62 on Interstate 80. Access to the TTU is provided via Box Elder County Road, which runs from Interstate 80 northward to the Union Pacific Railroad work site at Lakeside. Figure 1 of Attachment 1 shows the location of the TTU.

The TTU contains four sites used for treating waste ordnance by OB and/or OD. The four sites are shown in Figure 3, Attachment 1. Sites 1 and 4 are the rocket motor and scrap propellant OB pads. Site 2 consists of three smaller pads used as staging areas for munitions treated by OB/OD in areas adjacent to the pads and a large pad used for detonation of large missile motors. Site 3 is the location of the former munitions burn pan where small arms ammunition, flares, cartridge actuated devices (CADs), and propellant-actuated devices (PADs) were demilitarized by OB. This burn pan was decommissioned and partially closed in 2018. A more complete description of each of these sites is included in Attachment 1.

3.0 Waste Acceptance

The responsibility for waste identification of waste to be treated at the UTTR-North TTU lies with the generating organization. If the identification of a waste is beyond the capacity of the generating organization, 775 CES/CED, EOD Flight can assist in identifying the hazardous wastes during the turn-in process. The generating organization provides waste identification information to 75 CEG/CEIE as specified below. Regardless of which organization (on-site or

off-site) identifies the wastes, the wastes must be identified and characterized in accordance with the procedures in this WAP.

The following sources of information may be used to identify the characteristics and constituents of reactive waste items and materials:

- Package information;
- NSN;
- Local Stock Number;
- Federal Supply Class;
- DoD Hazardous Material Information System;
- The DoD Munitions Items Disposition Action System (MIDAS) database;
- National Fire Protection Agency Fire Protection Guide on Hazardous Materials;
- DOT Emergency Response Guide;
- National Institute for Occupational Safety and Health: (1) Pocket Guide to Chemical Hazards and (2) Occupational Health Guidelines for Chemical Hazards, Industrial Chart for Toxic and Hazardous Chemicals in Industry:
- EPA Document: "A Method for Determining the Compatibility of Hazardous Wastes;"
- MSDS provided by manufacturer;
- Contact with manufacturer;
- Technical Order (TO) 60A-1-1-9, "Description of and Disposal Procedures for Conventional Explosives and Related Hazardous Materials;" and
- TO 60A-1-1-31, "General Information on EOD Disposal Procedures."

In cases where the data provided are not sufficient to characterize the waste munition, EOD or 75 CEG/CEIE personnel will request additional information from the generator prior to treatment operations. No waste munition will be treated by OB/OD until EOD personnel are satisfied that both the physical and chemical data are sufficient to ensure the selected treatment process is appropriate, effective, and safe.

If a new type of munition is added to the inventory, 75 CEG/CEIE will provide written notice of the waste stream modification to DSHW. The notice will include a description of the components and combustion by-products.

Agencies requesting treatment of waste munitions and explosives at the TTU must submit their request to 75 CEG/CEIE. At a minimum, this request must include:

- Complete nomenclature and characterization data (e.g., MSDS) of waste munitions;
- Quantity to be treated;

- A statement that the items were manufactured under a DoD contract, are U.S. government property, and are authorized for treatment;
- Justification for treatment of the items, including a detailed description of the item and condition; and
- Instructions for treatment of any residue generated as a result of the treatment operation.

Once accepted for treatment, and prior to acceptance at the TTU, EOD personnel inspect the shipment to ensure the waste is properly identified, packaged, and manifested.

As part of the waste acceptance policy, EOD personnel will ensure proper tracking of accepted wastes. EOD personnel will use the following procedures for tracking incoming items:

- **Whole Motors:** EOD personnel will count the number of missile or rocket motors and verify the serial numbers with the hazardous waste manifest.
- **Propellant:** EOD personnel will check the shipment against the manifest, verifying the nomenclature and quantity.
- **Internal Shipments:** EOD personnel will count the items and verify that the items are listed on the hazardous waste manifest. EOD will also verify the control number on each manifest.
- **Miscellaneous Shipments:** EOD personnel will coordinate the shipment with the generating agency and verify that all items received are listed on the hazardous waste manifest.

4.0 Parameters and Rationale [R315-264-113]

All waste munitions treated at the TTU are standard military items with well-defined physical and chemical characteristics. In addition, due to the nature of the waste stream, direct representative analysis of military munitions and energetic wastes is not a part of this WAP. Rather, post-treatment analysis is used to ensure that the OB units at UTTR-North TTU sites are properly evaluated during the operating life of the permitted units.

Treatment operations may generate two classes of solid waste, ash residue (resulting from the OB treatment process) and solid residue (e.g., large metals fragments, pieces of PEP). Figure 1 presents a flowchart of the decision matrix used for classification and treatment of ash and other residue.

Since the solid residue may have come in contact with the reactive component(s), it is inspected in accordance with Technical Order (TO) 11A-1-60, “Inspection of Reusable Munitions Containers and Scrap Material Generated from Items Exposed to, or Containing Explosives.” If after inspection this residue is determined to contain residual reactive materials, the residue is re-treated. If it no longer exhibits a reactive characteristic and does not exhibit the characteristic of toxicity (R315-261-24), it is managed as solid waste.

Residual ash from various OB operations may exhibit the characteristic of toxicity. Samples are collected from those operations where residuals are uncharacterized or historical sampling data has indicated a potential for toxicity. The samples are analyzed based on the Toxicity Characteristic Leaching Procedure (TCLP). Analysis is conducted by a Utah-certified laboratory.

If the laboratory analysis indicates the ash is hazardous for the characteristic of toxicity, the residue is sent to a permitted hazardous waste disposal facility meeting the land disposal requirements of R315-268. If the analytical results indicate that the ash does not contain TCLP leachable metals in concentrations that exceed the limits of R315-261-24, the ash is managed as solid waste.

5.0 Test Methods [R315-264-13(b)(2)]

Post-treatment sampling is performed on previously uncharacterized ash when it is removed from the OB sites in order to make a hazardous waste determination per R315-262-11. With the exception of large metal fragments, no waste materials, ash, or other residues remain after the OD treatment process; therefore, post-treatment residues from OD activities are not analyzed. Soil sampling is periodically conducted at the TTU sites to confirm treatment effectiveness and characterize soil residuals, as specified in the Soil Sampling and Analysis Plan (SAP) (Attachment 9B).

All analytical tests are performed by a Utah-certified laboratory and are conducted in accordance with the protocol found in EPA SW-846, "Test Methods for Evaluating Solid Waste, Physical and Chemical Methods." Specific test methods may include ignitability (SW-846 Method 1010/1020), corrosivity (SW-846 Method 1110), reactivity (SW-846 Vol. 1, Chapter 7, Section 3), TCLP (SW-846 Method 1311), metals by inductively coupled plasma spectroscopy (SW-846 Method 6010), metals by atomic absorption spectroscopy (SW-846 7000 Series Methods), and explosive compounds (SW-846 Method 8330). As new methods are developed and become available, they will be used accordingly. All analytical reports are maintained by 75 CEG/CEIE.

6.0 Sampling Methods [R315-261-1090, R315-266-211, and R315-264-13(b)(3)]

The sampling equipment and collection/handling methods used for new, unknown, process changes, or reverification of wastes generated at the UTTR-North TTU sites follow EPA-approved sampling protocols contained in the most recent edition of SW-846. The following general sampling procedures and precautions are followed:

- Appropriate safety equipment (e.g., gloves and safety glasses) are worn during sampling. This requirement varies based on the specific chemical properties of the waste and the circumstances under which it is being sampled.
- Only non-sparking equipment is used during sampling.
- All necessary sampling equipment is within reach of the sampler before the sample is collected.

The ash or other residue will be sampled using a stainless steel scoop. This equipment and specified method are described in SW-846.

Specific samples will be collected based on the following methodology:

- Using a stainless steel or Teflon-lined scoop, collect 20 to 30 equal increments or grab samples from within the OB unit or area. Composite the increments by thoroughly mixing in a stainless steel bowl. Scoop the composited sample into an appropriate-sized glass sample container. Sample size will be determined by the amount required for the analytical

method(s) (typically 500 g will be collected). Immediately seal the sample container after sample collection. Sample seals are used to preserve the integrity of the samples from the time they are collected until they are opened in the laboratory.

- Record all required information on the sample bottle and chain-of-custody record including the preservation method and maximum holding time. All sample labels will be marked with the following information using indelible ink: name of the sampler, date and time of collection, sample collection location, and sample identifier that uniquely identifies the sample. The chain-of-custody record, at a minimum, includes the following information:
  - Sample collection location;
  - Date and time of collection;
  - Sample type (grab or composite);
  - Sample description (waste type);
  - Analyses to be performed; and
  - Signatures of the personnel involved in the custody of the samples.
- Analyze the sample using a Utah-certified laboratory in accordance with EPA SW-846. Samples will be delivered to the laboratory as soon as practical. The chain-of-custody accompanies the samples. Samples are properly packaged to avoid leakage or breakage during shipment.

Sampling devices and containers are cleaned before use. All used non-disposable containers and samplers are washed with warm detergent solution, rinsed at least three times with tap water, rinsed with distilled water, and air dried or wiped dry. All clean samplers, containers, etc., are placed in clean plastic bags and sealed. The cleaned and packaged equipment is stored in an appropriate area away from all new sampling equipment.

7.0 Frequency of Analysis [R315-264-13(b)(4)]

All waste streams treated at the TTU sites are energetic materials that have been manufactured in accordance with military specifications and strict manufacturing requirements. As such, these waste streams consist of PEP materials that are known.

Therefore, as discussed above, no pre-treatment analyses are performed on the energetic waste streams treated at the OB and OD units. However, post-treatment analyses are conducted to demonstrate treatment effectiveness and compliance with soil environmental performance standards, as well as for the proper disposition of the ash generated during OB treatment activities.

Uncharacterized and characteristically hazardous ash generated during OB treatment events will be collected, placed in storage containers meeting the requirements of R315-264-170, and transported to a designated hazardous waste accumulation point within the TTU. Samples of uncharacterized ash will be collected before or after containerization and analyzed for TCLP metals to determine whether the container contents are hazardous. A minimum of four samples

will be used to characterize ash generated from a particular waste stream. Recharacterization of a waste stream is necessary if there is a change in the waste or a treatment process change occurs.

Hazardous ash is transported to a permitted hazardous waste disposal facility that meets the land disposal requirements of R315-268. Nonhazardous ash is managed as a solid waste.

The nature of OD treatment allows for the complete destruction of the energetic materials, leaving only waste metal fragments (See Section 8 – OB/OD Treatment Effectiveness). Therefore, no sampling of this material is conducted.

Soil sampling is performed within the TTU site on a periodic basis. This sampling provides information on the nature and extent of chemical contamination. Sampling requirements are discussed in detail in the TTU Soil Sampling and Analysis Plan (Attachment 9B).

8.0 OB/OD Treatment Effectiveness [R315-264-600 and R315-270-23(d)]

OB/OD treatment effectiveness can only be measured through environmental performance analysis rather than technical performance standards (e.g., destruction and removal efficiency, such as for an incinerator), and is verified through measurements made in the field and during tests. The environmental and human health risk assessments described in Attachment 10, which provide an estimate of risk levels, are indicators of the treatment effectiveness of the OB/OD process.

The objective of each OB or OD event is to completely treat the reactive components of a waste munition item, or group of items. Maximum effectiveness is achieved by EOD personnel following procedures written for all of DoD by the U.S. Naval EOD Technology Division. These are published as Technical Orders (TOs). They represent years of testing and refinement, incorporating engineered approaches selected for their ability to achieve maximum treatment effectiveness. TOs, together with service-specific safety manuals and unit-specific operating instructions, are used to ensure that munitions are safely and effectively demilitarized. (A listing of these documents is found in Table 2 of Attachment 6, the Personnel Training Plan.) Each EOD technician is extensively trained and highly skilled in all ordnance treatment operations. Their skill and competence in treating ordnance thus represent the first level used to ensure maximum treatment effectiveness is achieved. Application of these skills and avoidance by EOD personnel of certain adverse climatic events, such as high winds, rain, or electrical storms, which could endanger their lives, has been proven to provide desirable results from OB or OD treatment operations. Following all treatments by OB/OD, EOD personnel inspect the treatment site to determine the effectiveness and completeness of the operation.

The most conclusive means of measuring the effectiveness of OB/OD is through a periodic sampling program that can be applied to all potentially affected media. A sampling and analysis program is capable of determining whether any media have been adversely impacted by treatment operations. The sampling program conducted at the TTU is described in more detail in the SAP (Attachment 9).

Treatment effectiveness can also be evaluated using tests. From 1989 to 1994, the U.S. Army's Dugway Proving Ground conducted a series of tests to identify and quantify the emissions produced by the OD of selected munition items. The sampling and analysis methods used to

detect and quantify the air emissions were based on EPA-approved methods. All tests were conducted at DPG within a 1000-m^3 flexible hemisphere, commonly known as the BangBox. These tests have been successfully audited by regulatory agencies. This test program was supported by a technical steering committee and a network of laboratories specializing in the sampling and analysis of trace air contaminant levels.

In all the tests, nearly all the carbon in the explosive mixtures was converted to CO_2 during the detonation process. All detected emissions were found at very low levels, typically at the parts per trillion level. Accordingly, OD appears to be an environmentally suitable method for disposing of the tested materials. DoD funded emissions testing has continued in recent years at the Naval Air Warfare Center Weapons Division in China Lake, CA.

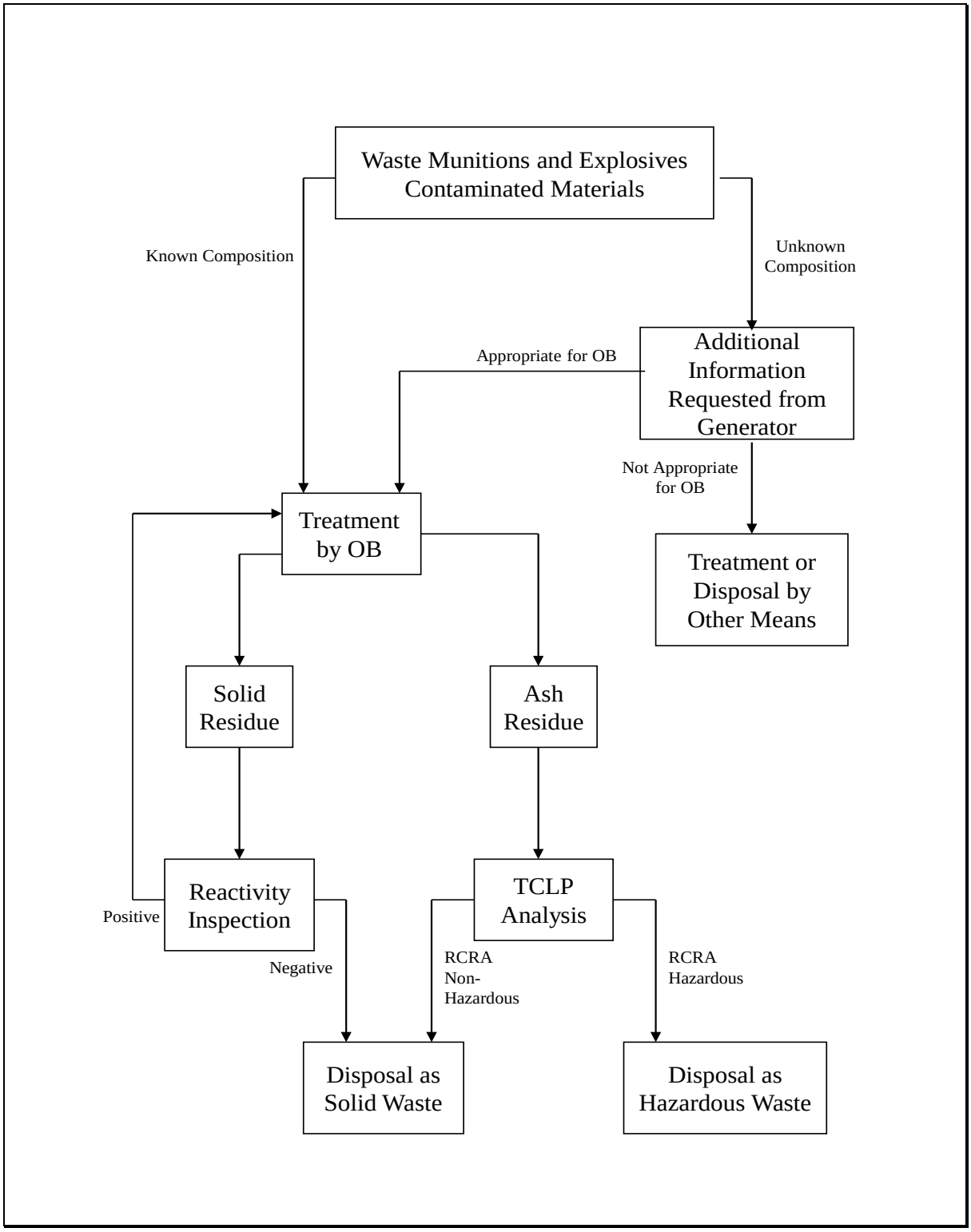

Figure 1. Waste Analysis Plan Decision Matrix