DEPARTMENT OF THE ARMY
Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, TN 37660

April 15, 2020

REPLY TO
ATTENTION OF

Alan A. Annicella
Chief. Land, Asbestos and Lead Section
Chemical Safety and Land Enforcement Branch
Enforcement and Compliance Assurance Division
U.S. EPA, Region 4
61 Forsyth St., SW
Atlanta, Georgia 30303-3104

Dear Mr. Annicella,

On February 17, 2020 Holston Army Ammunition Plant (HSAAP) received your Request for Information dated February 11, 2020. HSAAP requested an extension to the response timeline on February 18, 2020 and was granted an additional 30 days to respond by Ms. Hansen on February 24, 2020. The information attached and below presents the HSAAP response to the subject Request for Information.

Per the instructions under Enclosure A of the Request for Information, HSAAP offers the following information.

A1. The persons responding to these Information Requests include: HSAAP Environmental Engineers and Joint Munitions Command (JMC) Risk Management Division.

A2. Individual responses to each question in Attachment C of the Request for Information is included in the attached response and is supported by the information in appendices A – J.

A3. Each response is numbered numerically to correspond with the associated question number in Attachment C of the Request for Information.

A4. All Army persons consulted in the attached responses are accounted for above in A1. Additional personnel consulted during the responses include BAE Systems, Ordnance Systems Inc. (BAE) Environmental Affairs Specialists; BAE Environmental Manager; and BAE Safety Technologist. All supporting documents are included in appendices A – J.

A5. All information is accurate and complete to our knowledge at this time.

A6. All documents have been placed into a labeled appendix that is referenced in each associated response.

A7. Any additional clarifications to the requested information and associated documents are contained in the response itself.

A8. All information responsive to this Information Request was in the possession of the personnel referenced in A1.

A9. There are no additional facility personnel who have additional information about these responses. All information has previously been inspected by the Tennessee Department of Environment and Conservation (TDEC) and represents the basis of current and past waste management practices at HSAAP.

A10. No confidential information or trade secrets are identified in these responses. However, in order to protect financial and personnel data of the Operating Contractor, BAE; information associated with this data in Appendices D, F, G, and J has been redacted. However, please note that all official signatures remain.

Responses to Enclosure C of the Request for Information is attached. HSAAP looks forward to working with you. If you have any questions please contact Laura Peters, HSAAP Environmental Engineer, at phone: (423) 578-6193 or email: laura.l.peters15.civ@mail.mil.

Sincerely,

Joseph R. Kennedy
Commander's Representative

Enclosure

cc: Mr. Todd Hayes, BAE Systems
Mr. Patrick Flood, TDEC Nashville
Mr. Chris Lamb, TDEC JCFO

Enclosure C Information Request Responses

Regulatory Summary

The EPA Region 4 issued a letter requesting information from Holston Army Ammunition Plant located at 4509 West Stone Drive, Kingsport, Tennessee, to determine the facility's compliance status with hazardous waste determination and recordkeeping procedures.

Potentially Explosive-Contaminated Materials

The EPA Region 4 is requesting information from the Holston on all hazardous waste determination(s) conducted on Potentially Explosive-Contaminated Materials (PECM) open burned in the facility's onsite burn piles and cages.

1. Please identify and submit a list of all PECM that have been burned in the facility's onsite burn piles and cages for the past five years.

   DODI 4140.62 is the instruction that introduces the term material documented as an explosive hazard (MDEH), along with material potentially presenting an explosive hazard (MPPEH) and material documented as safe (MDAS). This instruction was created to better process waste from a safety perspective. This instruction was not written to be interpreted or used to characterize waste pursuant to RCRA. Under DODI 4140.62, all potentially contaminated material is initially classified as MPPEH, which is only an interim classification under the program. Therefore, all material that is MPPEH must subsequently be categorized as either MDAS or MDEH. The MDEH category not only includes those items which are clearly MDEH, but it also includes those items which cannot be classified as MDAS. The solid wastes processed at the HSAAP burning grounds are primarily the latter. HSAAP would like to clarify to EPA that while this material must default to MDEH for safety precautions, it is not automatically synonymous with RCRA Reactive, D003. In this instance, therefore, the MDEH material must be separately evaluated for reactivity under RCRA. In support of this, Appendix A includes language from TDEC annual Hazardous Waste inspection reports as well as language taken from the December 2015 EPA Hazardous Waste Compliance Evaluation Inspection completed by Mr. William Kappler EPA Region 4. All quoted inspection reports document these waste streams as solid waste.

   A list of the 9 waste streams that HSAAP processes at the burning ground as MDEH solid waste is summarized below. The complete list and waste stream determinations can be found in Appendix B.

   Please note: Waste stream #8 (explosives contaminated oil) has not been burned in the pile since January 2018 as a result of the attempt to reclassify it as MDAS under DODI 4140.62 requirements, and in an effort to divert this stream away from the burning ground.

   Waste Stream #1 – Concrete and Masonry from limited area

   Waste Stream #2 – Fiber drums and Cardboard from the limited area

   Waste Stream #3 – Metal from the limited area

   Waste Stream #4 – Personal Protective Equipment (PPE) from limited area

   Waste Stream #5 – Wood

Waste Stream #6 – Soil

Waste Stream #7 – Plastic

Waste Stream #8 – Explosives Contaminated Oil

Waste Stream #9 – General Explosives Manufacturing Waste

2. From the list of PECM identified in number 1, please describe the point of generation, the process operation, and provide a detailed description of how each PECM is generated.

Per the definitions section of the 11 Feb 2020 letter to Colonel Louis Ortiz, generation is defined as any act or process which produces hazardous waste as identified or listed in 40 CFR Part 261 or an act which first causes a hazardous waste to become subject to such regulation. HSAAP does not classify the contaminated materials at the burning ground as a hazardous waste. We classify these items solid wastes that are material potentially presenting an explosive hazard (MPPEH) which cannot be determined to be MDAS, and therefore default to MDEH. A description of the processes that create the waste streams can be found on pages 1, 7, 13, 19, 25, 31, 37, 43, and 49 of Appendix B under the "Process/Building Generating Waste" section of each determination.

3. For each PECM identified in number 1, please provide a detailed description identifying 100 percent of its material composition and percentage of each material component.

The composition of each waste stream is documented on pages 1, 7, 13, 19, 25, 31, 37, 43, and 49 of Appendix B under the "Composition" section of each determination. The following summarizes the composition for each waste stream. Further compositional breakdown of these streams are not available as all materials are traditionally accepted solid wastes.

Waste Stream #1 – Concrete and Masonry from limited area

This stream consists of all concrete, brick, or masonry items from the limited area that cannot be documented as MDAS.

Waste Stream #2 – Fiber drums and Cardboard from the limited area

This stream consists of cardboard fiber drums and cardboard items. Cardboard fiber drums also contain metal rings at the top and bottom of the drum for product durability. These are items from the explosive production limited area that cannot be documented as MDAS.

Waste Stream #3 – Metal from the limited area

This stream consists of various metal items from the explosive production limited area that cannot be documented as MDAS.

Waste Stream #4 – Personal Protective Equipment (PPE) from explosive production limited area

This stream consists of PPE items (plastic, metal, Tyvek, leather, rubber, cotton) used in explosives manufacturing in the explosives production limited area that cannot be documented as MDAS.

Waste Stream #5 – Wood

This stream consists of a mixture of wood items with potential for existence of explosives contamination. If enough contaminated wood material isn't present on the pile, then clean wood is added as a fuel source to aid in achieving the required decontamination time and temperature for all materials.

Waste Stream #6 – Soil

This stream consists of soil and gravel from within the explosive production limited area that has been contaminated or is suspected to be contaminated with explosives. The gravel is primarily limestone and the soil is primarily clay. This soil cannot be documented as MDAS.

Waste Stream #7 – Plastic

This stream consists of primarily plastic (Polypropylene/Polyethylene) from the described drum liners and nutsche covers from explosives production processes. These items cannot be documented as MDAS.

Waste Stream #8 – Explosives Contaminated Oil

This stream consists of used lubricating and hydraulic Oil with the potential for explosives to be present. HSAAP is pursuing a process to document this material as MDAS. As such, the material is still in the interim classification of MPPEH. MPPEH Used Oil has not been burned on the pile since January 2018. Previously, the addition of this oil to the pile also served as an additional fuel source to aid in achieving the required decontamination time and temperature for all materials.

Waste Stream #9 – General Explosives Manufacturing Waste

This stream consists of a mixture of cloth (cotton, Teflon®) filters, cloth (cotton) probe socks, and cloth (cotton) nutsche covers from explosives production processes that cannot be documented as MDAS.

4. For each PECM identified in number 1, please provide a detailed description identifying 100 percent of its chemical composition and percentage of each chemical component.

   All materials that are sent to the burn pile are common industrial materials that, when uncontaminated, are traditionally sent to non-hazardous landfills. Underlying hazardous constituents for each waste stream are addressed in Appendix B on pages 2, 8, 14, 20, 26, 32, 38, 44, and 50.

5. For each PECM identified in number 1, please provide all records of waste determination(s) conducted by the facility by using one or a combination of the following:

   a. Process knowledge (e.g., information about chemical feed stocks and other inputs to the production process); knowledge of products, by-products, and intermediates produced by the manufacturing process; chemical or physical characterization of wastes; information on the chemical and physical properties of the chemicals used or produced by the process or otherwise contained in the waste; testing that illustrates the properties of the waste; or other reliable and relevant information about the properties of the waste or its constituents.

   b. If testing was completed, please state how you obtained a representative sample of the waste for the testing and what test method was used to obtain the results of the regulatory test.

See **Appendix B, pages** 2, 8, 14, 20, 26, 32, 38, 44, and 50 under "Source of Information" for Solid Waste Stream Determinations # 1 – 9.

For waste stream #6 (soil), any contaminants that are not process related where generator knowledge is not applicable, the material will be sampled for determination purposes. Analytical results for two instances where an oil was released from historical piping is included in Appendix J. For these particular instances, the oil was collected and sampled directly. This sample result was used to make a determination on the contaminated soil itself. Because the release at I-3 occurred prior to the HSAAP implementation of the MPPEH program and the soil's proximity to an active production building, the excavated soil was placed on the burn pile. Soil from G-4 was reviewed under the MPPEH program, cleared as MDAS, and sent to the on-site landfill under a special waste permit.

6. For each PECM identified in number 1, please provide records that support the waste determination(s) in number 5 for any of the listing descriptions under subpart D of 40 C.F.R. part 261.

   HSAAP Solid Waste Streams #1-9 do not meet any of the listing descriptions (or derivatives pertaining to residues) under subpart D of 40 CFR, part 261. See **Appendix B, pages** 2, 8, 14, 20, 26, 32, 38, 44, and 50 "Listed?"

7. For each PECM identified in number 1, please provide records that support the waste determination(s) in number 5 above for the characteristic of reactivity for each of the following properties:

   Please see **Appendix B, pages** 3, 9, 15, 21, 27, 33, 39, 45, and 51, "D003 Characterization and Documentation."

   a. It is normally unstable and readily undergoes violent change without detonating.

   b. It reacts violently with water.

   c. It forms potentially explosive mixtures with water.

   d. When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

   e. It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

   f. It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

   g. It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

   h. It is a forbidden explosive as defined in 49 CFR 173.54, or is a Division 1.1, 1.2 or 1.3 explosive as defined in 49 CFR 173.50 and 173.53.

8. For the burn residue and/or ash generated after each burn conducted in the burn piles and cages, please provide the waste determination records required by 40 CFR 268.7 and 40 CFR 268.9.

   Burn residue and/or ash generated after each burn conducted in the burn piles is considered a special waste granted in the permit for the on-site Class II landfill. In 2019, TDEC had requested that this special waste determination and analytical be updated. See **Appendix C** for Waste Determination Record for Burn Pile Ash. See **Appendix D** for analytical package. See **Appendix E** for the follow-up letter by TDEC noting the approval for on-site landfill as a non-hazardous waste ash residue. Pile ash also represents the sampling from the cages. Ash from cage burns is placed on the pile after each cage burn for additional thermal decontamination. The cage burn itself does not meet the time requirements for thermal decontamination. Therefore, the pile serves as the additional thermal decontamination time for the cage material and the ash sampling is a representative sample of both areas which are permitted as a single unit under the Title V permit.

9. For the explosive-contaminated material burned in the RCRA permitted Subpart X unit, please provide a detailed description identifying 100 percent of its chemical composition and the percentage of each chemical component.

   Explosive-contaminated material is not permitted to be burned (and is not burned) in the RCRA permitted Subpart X unit.

<u>Used Oil and Waste Oil</u>

The EPA Region 4 is requesting information from Holston Army Ammunition Plant located at 4509 West Stone Drive, Kingsport, Tennessee, to determine the facility's compliance status with used oil requirements 40 C.F.R. 279.

10. Please identify and submit a list of all process operations where used oil and waste oil are generated.

    Used Oil is generated at Building 556 (Automotive Repair Shop) during maintenance of machinery and government owned vehicles. Small quantities of used oil generated throughout the facility are staged in this building pending laboratory results. The used oil is sometimes then transferred to a diked 2,500 gallon tank for storage prior to recycling or handled as hazardous waste (if ever determined so).

    Used Oil is generated at Building 200 (Steam Plant) and Building 219 (Steam Plant Maintenance Shop) during daily operations from maintenance activities on oil-using equipment related to the steam plant operations.

    Used Oil is generated at Building 235 (Wastewater Plant) from various moving equipment at the Wastewater facility.

    Used Oil is generated at Building 105 (Transporter Shop) from the routine maintenance of transporter equipment.

    Used Oil has always been recycled off-site.

    Waste Oil was the term formerly used to describe Solid Waste Stream #8, Explosives Contaminated Oil. This term has been accepted by TDEC as documented in the past CEI

inspections. (See Appendix A). HSAAP has updated this category of oil to be MPPEH Used Oil so that it is further scrutinized for MDAS standards. This oil is managed as used oil and typically stored at 157 and T2 until explosives can definitively be determined not to be present by R&D for MDAS clearance.

11. For items identified as waste oil, please state why the oil is identified as "waste oil" instead of "used oil" as defined in 40 CFR 279.1. Please provide supporting documentation.

    Oil that is generated inside of the production building has historically been managed as "Waste Oil" not to be recycled because of the potential for explosives contamination. Essentially, in the past, we had "on-spec Used Oil" that was potentially contaminated with explosives—for that reason we labelled it as "Waste Oil." This material did not have a safety mechanism to clear it as safe for release (MDAS). In addition, "Waste Oil" is also permitted to be used as a #2 fuel oil to aid in achieving the desired time and temperature for decontamination requirements of the pile.

    As noted in the 2016 **EPA/TDEC** led CEI inspection conducted in December of 2015 (see Appendix A), "*TDEC has approved the use of the words Waste Oil due to the possibility of the used oil contaminated with explosive residue*"**.**

    Prior to burning, oil was sampled for TCLP Metals, Toxicity, and PCBs. **This management method has been clearly documented in all historical TDEC inspection reports.** Since 1/22/2018 HSAAP has chosen not to burn any oil from explosives production buildings on the pile. Instead, HSAAP has chosen to manage oil from the production area as Used Oil, per environmental regulations and concurrently as MPPEH per DoDI 4140.62 requirements. This change was implemented in the pursuit to divert this stream away from open burning. To this end, HSAAP currently has Used Oil drums (by generator/process knowledge) that are categorized as MPPEH (MPPEH Used Oil). The current challenge is finding a confident analytical measurement of explosive detectability in the MPPEH Used Oil to be able to Document as Safe (MDAS) per DoDI 4140.62 requirements. In the effort to avoid burning the oil, we are still pursuing that measurement.

12. For each used oil and waste oil identified in number 10, explain how the used oil and waste oil is managed once it is generated.

    For any generation of oil, analytical testing is conducted prior to burning or sending off site for recycle. Analysis includes TCLP Metals, PCBs, and Toxicity. Used oil is stored in authorized locations covered under facility wide SPCC plan or in the bulk Used Oil tank until it is picked up for recycle by an off-site recycling vendor.

13. For each used oil and waste oil identified in number 10, identify the final disposition of the used oil and waste oil, please provide supporting records for off-site shipments.

    See **Appendix F**

14. For each used oil and waste oil identified in number 10 that is "thermally decontaminated" by being burned on or in the burn pile and cages, please provide the records required by 40 CFR 279.72(a) and 40 CFR 279.72(b), showing the analysis of the oil.
    See **Appendix G**

The EPA Region 4 is requesting information from Holston Army Ammunition Plant located at 4509 West Stone Drive, Kingsport, Tennessee, regarding TDEC Case 03-HCA003.

15. Please provide five years of groundwater and surface water sampling results and related reports for locations MW104-MW107 generated in accordance with TDEC Case 03-HCA003.

MW104-MW107 represents the 4 monitoring wells at the plant Area A. These wells are boundary wells that monitor the 4 SWMUs in LTM at area A. No explosives have ever been present at Area A. These SWMUs monitor sanitary landfill and coal tar disposal areas. No surface water sampling is conducted at Area A. These 4 wells are monitored for Benzene, Methylene Chloride, and naphthalene in the spring and fall sampling events. Please see Appendix H. The source document is the Long Term Monitoring report, which is Appendix I.

Appendix A

Excerpts from annual TDEC Hazardous Waste Compliance Evaluation Inspection (CEI) Reports

From **2015** Annual Hazardous Waste TDEC Inspection (Conducted on July 28th and 29th, 2015)

> *"Potentially explosive materials from the production buildings such as contaminated paper, plastic, and filter cloths are burned in two wire cages. Waste wood, explosives contaminated waste oil generated in the explosive department, metal and plastic liners are burned in an open area.* ***These potentially explosive materials are not hazardous waste****, but are subject to recordkeeping requirements and impact sensitivity testing. The decontaminated metals are sold as scrap metal to recyclers and ash is tested for impact sensitivity and discarded as a special waste at H[S]AAP's class II solid waste landfill." (Page 6)*
>
> *"Analytical results for waste oil generated from the production area and burned on the burn pile were reviewed." (Page 10)*
>
> ***No violations were noted.***

From **2016** Annual Hazardous Waste TDEC Inspection (Conducted on December 9th and 10th, 2015)

Note: this was a co-led CEI inspection with TDEC and EPA. EPA released their own report of the inspection evaluation conducted by William Kappler (EPA, RCRA & OPA Enforcement and Compliance Branch) and report letter signed by Hector Danois (Acting Chief, Hazardous Waste Enforcement and Compliance Section).

> **TDEC CEI Report (*letter/report dated January 22, 2016*)**
>
> *"Potentially explosive materials from the production buildings such as contaminated paper, plastic, and filter cloths are burned in two wire cages. Waste wood, explosives contaminated waste oil generated in the explosive department, metal and plastic liners are burned in an open area.* ***These potentially explosive materials are not hazardous waste****, but are subject to recordkeeping requirements and impact sensitivity testing. The decontaminated metals are sold as scrap metal to recyclers and ash is tested for impact sensitivity and discarded as a special waste at H[S]AAP's class II solid waste landfill." (Page 6)*
>
> *"Behind Building 157 there is a storage area for waste oil generated in the manufacturing area that is potentially contaminated with explosives. The waste oil is tested for metals and VOC's. The waste oil is mixed with sawdust then transported to the permitted area for burning on the burn pile. At the time of inspection, there were thirteen drums containing waste oil pending analysis outside Building 157. The containers were labeled 'Waste Oil'." (Page 8)*
>
> *"Analytical results for waste oil generated from the production area and burned on the burn pile were reviewed." (Page 11)*
>
> ***No violations relating to above excerpts were noted.***
>
> **EPA CEI Report (letter/report dated February 10, 2016)**
>
> *"Potentially explosive materials from the production buildings such as contaminated paper, plastic, and filter cloths are burned in two wire cages. Waste wood, explosives contaminated*

waste oil generated in the explosive department, metal and plastic liners are burned in an open area. ***These potentially explosive materials are not hazardous waste****, but are subject to recordkeeping requirements and impact sensitivity testing. The decontaminated metals are sold as scrap metal to recyclers and ash is tested for impact sensitivity and discarded as a special waste at H[S]AAP's class II solid waste landfill." (Page 5)*

"Behind Building 157 there is a storage area for waste oil generated in the manufacturing area that is potentially contaminated with explosives. The waste oil is tested for metals and VOC's. The waste oil is mixed with sawdust then transported to the permitted area for burning on the burn pile. Inspectors observed several 55-gallon containers accumulating used oil. The containers were closed and labeled with the words "Waste Oil". ***TDEC has approved the use of the words Waste Oil due to the possibility of the used oil contaminated with explosive residue.****" (Page 9)*

No violations relating to above excerpts were noted.

From **2017** Annual Hazardous Waste TDEC Inspection (Conducted on June 6th and 7th, 2017)

"Potentially explosive materials from the production buildings such as contaminated paper, plastic, and filter cloths are burned in two wire cages. Waste wood, explosives contaminated waste oil generated in the explosive department, metal and plastic liners are burned in an open area. ***These potentially explosive materials are not hazardous waste****, but are subject to recordkeeping requirements and impact sensitivity testing. The decontaminated metals are sold as scrap metal to recyclers and ash is tested for impact sensitivity and discarded as a special waste at H[S]AAP's class II solid waste landfill." (Page 6)*

"Behind Building 157 there is a storage area for waste oil generated in the manufacturing area that is potentially contaminated with explosives. The waste oil is tested for metals and VOC's. The waste oil is mixed with sawdust then transported to the permitted area for burning on the burn pile. At the time of inspection, there were eight drums containing waste oil pending analysis outside Building 157. The containers were labeled 'Waste Oil'." (Page 8)

"Analytical results for waste oil generated from the production area and burned on the burn pile were reviewed."(Page 12)

No violations relating to above excerpts were noted.

From **2018** Annual Hazardous Waste TDEC Inspection (Conducted on April 24th, 2018)

"Potentially explosive materials from the production buildings such as contaminated paper, plastic, and filter cloths are burned in two wire cages. Waste wood, explosives contaminated waste oil generated in the explosive department, metal and plastic liners are burned in an open area. ***These potentially explosive materials are not hazardous waste****, but are subject to recordkeeping requirements and impact sensitivity testing. The decontaminated metals are sold as scrap metal to recyclers and ash is tested for impact sensitivity and discarded as a special waste at the on-site landfill." (Page 6)*

"Behind Building 157 there is a storage area for waste oil generated in the manufacturing area that is potentially contaminated with explosives. The waste oil is tested for metals and VOC's. The waste oil is mixed with sawdust then transported to the permitted area for burning on the

burn pile. At the time of inspection, there were fifteen drums containing waste oil pending analysis outside Building 157." (Page 12)

"Analytical results for waste oil generated from the production area and burned on the burn pile were reviewed." (Page 15)

No violations relating to above excerpts were noted.

From **2019** Annual Hazardous Waste TDEC Inspection (Conducted on April 3rd, 2019)

"Potentially explosive materials from the production buildings such as contaminated paper, plastic, and filter cloths are burned in two wire cages. Waste wood, explosives contaminated waste oil generated in the explosive department, metal and plastic liners are burned in an open area. ***These potentially explosive materials are not hazardous waste****, but are subject to recordkeeping requirements and impact sensitivity testing. The decontaminated metals are sold as scrap metal to recyclers and ash is tested for impact sensitivity and discarded as a special waste at the on-site landfill.* ***Ash generated from the burning of potentially explosive waste must be analyzed and results submitted to DSWM prior to the next disposal event. The composition of plastics have changed since the initial waste characterization."*** (Page 6)

"Behind Building 157 there is a storage area for waste oil generated in the manufacturing area that is potentially contaminated with explosives. The waste oil is tested for PCB's, metals and VOC's. The waste oil is transported to the permitted area for burning on the burn pile. Waste oil was not present at the time of the inspection." (Page 8)

"Analytical results for waste oil generated from the production area and burned on the burn pile were reviewed." (Page 12)

"The ash generated from the burn pile (operating under Title V air permit) should be analyzed and results submitted to the Johnson City Field Office DSWM. Although the ash is included as an approved special waste in the landfill permit, the composition of material burned has changed since the initial analysis was conducted. The results must be submitted and evaluated by DSWM prior to the next disposal." (Page 13)

No violations relating to above excerpts were noted.

In addition, it may be important to note that **EPA** also conducted a CEI inspection in **2007** with TDEC. In this report, the following was noted about burn cage and pile waste:

"Any contaminated debris is placed into a burn area fenced by web wire. The ashes from the burn pans and contaminated debris are discarded as a special waste in the facility's landfill." (Page 3)

"The facility also places any contaminated waste in marked 30-gallon containers that is later transferred to the burn pile for contaminated debris. Some of the contaminated waste were observed outside the containers. ***EPA recommends that the contaminated waste be placed in the containers prior to disposal."*** *(Page 4 and 5)*

No violations were noted during this inspection.

*EPA also conducted a Multi-media inspection in **2011** with TDEC. In TDEC's CEI report, the above language on pile and cage burning remained the same.*

STATE OF TENNESSEE
TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
JOHNSON CITY ENVIRONMENTAL FIELD OFFICE
2305 SILVERDALE DRIVE
JOHNSON CITY, TENNESSEE 37601-2162
(423) 854-5400 STATEWIDE 1-888-891-8332 FAX (423) 854-5401

April 8, 2019

CERTIFIED MAIL #7018 1830 0001 0708 4963
RETURN RECEIPT REQUESTED

Mr. Joseph Kennedy
Commander's Representative
Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, TN 37660

Re: **Hazardous Waste Compliance Evaluation Inspection**
Holston Army Ammunition Plant
Hazardous Waste Permit TNHW-148
TN5 21-002-0421

Dear Mr. Kennedy:

On April 3rd, 2019 the Tennessee Department of Environment and Conservation (TDEC) conducted a Hazardous Waste Compliance Evaluation Inspection (CEI) at the referenced facility. TDEC's Division of Solid Waste Management (DSWM) evaluated the facility's compliance with the *Tennessee Hazardous Waste Management Act*, T.C.A. §68-212-101 et seq., with the *Used Oil Collection Act of 1993* T.C.A. 68-211, Part 10, Tennessee's Hazardous Waste Regulations (Division Rule Chapter 0400-12-01) promulgated pursuant to those Acts, and the conditions of Open Burn Treatment Permit TNHW-148.

During the inspection, violations of Tennessee's hazardous waste management regulations were identified. The attached Inspection Report/Notice of Violation (NOV) details inspection findings. Holston Army Ammunition Plant must initiate immediate actions to correct outstanding violations. The DSWM will conduct a follow-up inspection after May 6th, 2019 to verify the facility's compliance status.

The DSWM appreciates the courtesy and cooperation shown by Holston Army Ammunition Plant during the inspection. Should you have any questions concerning this report, please do not hesitate to contact me at 423-854-5465 or by email: John.C.Webb@tn.gov.

Sincerely,

John C. Webb, P.E.
Environmental Consultant 2
Division of Solid Waste Management
Johnson City Environmental Field Office

cc: Mr. Billy Shelton, BAE
Enforcement Section, DSWM/Nashville (electronic)
Ashley Holt, DSWM/Nashville (electronic)
Central File, DSWM/Nashville (electronic)

JCW/190219098

HAZARDOUS WASTE INSPECTION REPORT

SITE/PHYSICAL LOCATION:

Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, TN 37660
TN5 21-002-0421
Hawkins County

PRIMARY CONTACT:

Mr. Daniel Reed
Environmental Affairs Specialist
BAE Systems Ordnance Systems, Inc. (BAE)
4509 West Stone Drive
Kingsport, TN 37660
Telephone: 423/578-1296
Email Address: Daniel.Reed5@baesystems.com

DATE AND START TIME OF INSPECTION:

Date: 4/3/2019
Time: 8:00 a.m.

INSPECTION PARTICIPANTS:

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Email Address: JohnC.Webb@tn.gov

PURPOSE OF INSPECTION:

This routine inspection was conducted to evaluate Holston Army Ammunition Plant's compliance with the applicable requirements of Tennessee's Hazardous Waste Management Act T.C.A. 68-212, Parts 1 and 3, with the Used Oil Collection Act of 1993 T.C.A. 68-211, Part 10, and with the regulations adopted pursuant to those Acts, in addition to the conditions of Open Burn Treatment Permit #TNHW-148. Inspection findings are based upon site observations, file review, and verbal and written information provided by facility personnel during the inspection (including the identification of all physical locations where wastes are generated and managed by the facility). The facility is encouraged to advise the DSWM of any information in the report or attached letter that the facility deems to be incorrect. Any such communication should be submitted to the DSWM within fifteen (15) days following receipt of this report.

FACILITY DESCRIPTION:

Holston Army Ammunition Plant (HAAP) manufactures explosives and explosive formulations. HAAP is a federal facility located on 6,000 acres and is currently operated under contract by BAE Systems Ordnance Systems, Inc. (BAE). HAAP is composed of two manufacturing areas, explosive storage magazines, on-site industrial landfill (IDL 37-104-0090), an industrial wastewater treatment facility and a permitted treatment unit. NAICS Code: 32592.

GENERATOR STATUS:

Based on the information provided to the DSWM, Holston Army Ammunition Plant is a large quantity generator of hazardous waste, universal waste small quantity handler, used oil generator, and a permitted Treatment, Storage, and Disposal Facility (TSDF) that operates permitted Burn Pan Units (Hazardous Waste Permit TNHW-148) for the thermal treatment of K044 and D003 reactive hazardous wastes.

HAZARDOUS WASTESTREAMS GENERATED:

WS #1 – Waste explosives (D003) from the manufacture of RDX, HMX and related compositions, generated at an estimated rate of 12,141 lbs/mo.

WS #32 – Lead paint waste (D008/D001) from removal of lead-based paint by sandblasting, scraping or substrate removal, intermittently generated at an estimated 600 lbs/mo.

WS #47 – Labpack (D001/D002/D003/D005/D007/D009/D001/U108) from disposal of various laboratory chemicals, intermittently generated at an estimated rate of 725 lbs/mo.

WS #53 – Waste cyclohexanone (D001, F003) from storage tank emptied for dike maintenance 720 lbs.

WS #55 – Waste settled catch basin explosives (D003/K044) from the settling of process water through building catch basins, generated at an estimated rate of 10,843 lbs/mo.

WS #60 – Waste 2CL-2NP decant water (D002) from the production of 2,3-Dimethyl 2,3-Dinitrobutane DMDNB, intermittently generated at an estimated rate of 150,150 lbs/mo.

WS #65 – Waste acetone with DMDNB (D001) from the disposal of waste from production of DMDNB, intermittently generated at an estimated rate of 18,500 lbs/mo.

WS #70 – Waste used COD vials (D002/D007/D009/D011) for recycling from routine COD testing of industrial wastewater conducted at on site lab, generated at an estimated rate of 450 lbs/mo.

WS #72 – Waste cyclohexanone, butyl alcohol and acetone (D001/F003) from disposal of degraded, off-specification material, intermittently generated at an estimated rate of 109,220 lbs/mo.

WS #73 – Waste DMSO contaminated with F005 solvent (D001) from disposal of off-spec material from intermittent process, intermittently generated at an estimated rate of 159,109 lbs/mo.

WS #77 – Spent nitric acids from DNAN and NTO processes from nitration reaction (D002), generated at an estimated rate of 490,620 lbs/mo.

WS #78 - Untreated Ammonia Nitrate Solution (D007) from explosives production generated at an estimated rate of 700,000 lbs/mo.

WS #83 – Waste MEK from production errors. 1765 lbs.

WS #85 - Waste sulfuric acid from TATB filtration process (D002), intermittently generated at an estimated rate of 34,391 lbs/mo.

WS #87 - Waste ethyl acetate from disposal of degraded, off-specification material (D001), intermittently generated at an estimated rate of 3,054 lbs/mo.

WS #88 - Waste NQ mother liquor from nitroguanidine production (D002), intermittently generated at an estimated rate of 760,920 lbs/mo.

WS #91 - Magnesium nitrate waste from the production of nitric acid (D002), intermittently generated at an estimated rate of 157,440 lbs/mo.

WS #92 - Waste neutralized and treated acid form NTO (D002), generated at an estimated rate of 713,900 lbs/mo.

INSPECTION FINDINGS:

Area B Manufacturing

The principal explosives manufactured at HAAP, cyclotrimethylene trinitramine (RDX) and cyclotetramethylene tetranitramine (HMX), are used to make various explosive products. Raw materials (acetic acid, nitric acid, ammonium nitrate, acetic anhydride and hexamine) are pumped from Buildings 151 and 330 to Building D. In Building D, nitrification of the raw materials produces acetic acid slurry of the crude explosive. The acetic acid slurry is washed in Building E to remove the acid. The acetic acid is piped to the primary distillation line (acid recovery building B-3) where any remaining explosives are recovered and returned to one of the G buildings for recrystallization. Additionally, an ammonium nitrate solution and a weak acetic acid stream are generated. HSAAP also manufactures nitrotriazolone (NTO) for insensitive munitions (IMX) products. The NTO process generates spent nitric acid. Two 90-day hazardous waste storage tanks (numbers 15 and 17) are located at Building E-10 tank farm and typically contain spent nitric acid **(WS#92)**. On occasion these tanks store other compatible wastes as necessary. One additional 90-day hazardous waste storage tank (number 14) is located at Building E-4 tank farm and contains spent "mother liquor" **(WS#88)** from recrystallization of nitroguanidine. Another 90-day hazardous waste storage tank (number 20) is found at Building B-5 and is used to store waste ammonia nitrate solution **(WS#78)**. The tanks have coated concrete secondary containment and are equipped with emergency equipment.

The weak acid from B-3 is pumped to Area A for reprocessing into glacial acetic acid or pumped to B-351 at Area B for reprocessing into glacial acetic acid or acetic anhydride. Still bottoms from B-3 consisting of ammonium nitrate and amine nitrates at 55-65% are generated during the distillation of the acetic acid. The material (still bottoms) is sold to MSI as product to make commercial explosives for the mining industry or sent off-site for disposal as a hazardous waste. The explosive/water slurry is pumped to Building G where it is partially dissolved in a solvent (acetone, cyclohexanone) and recrystallized. The type of solvent used depends on which explosive is being manufactured.

The recrystallized explosive, which remains in a water slurry, is pumped to Building H where it is dewatered. All wastewater is piped to the on-site wastewater treatment plant. The explosive is sent to various Buildings (L – N) as needed for incorporation to produce specific formulations, drying, and packaging. The product is packaged for shipment or storage. Explosives entrained in the water from the dewatering step, from building and equipment cleaning, etc. are settled in catch basins located at each production building. The waste explosives **(WS#55)** are removed from each basin and placed into a 30-gallon satellite accumulation drum located at each catch basin. Each active explosives production building is equipped with a labeled satellite waste explosive drum. *All drums were closed and labeled at the time of the inspection.* The number of active buildings can vary. The waste explosives are transported weekly to the permitted area for treatment.

Steam required to operate the processes is generated by coal-fired and natural gas fired boilers at Area B. The cinders are mixed with biosludge and currently disposed of in the on-site landfill at Area B along with flyash. The transition to natural gas has resulted in less flyash, so BAE is

evaluating the possibility of wood chips as a bulking agent for IWWTP sludge with disposal at the on-site landfill.

The explosive formulations are made by batch process. Waste solvent generated from batch production of these explosives is stored in a tank for further use. If the waste solvent cannot be reused, it is pumped directly to a transport vehicle and managed as a hazardous waste after exiting the process tank.

Permitted Treatment Units (TNHW-148)

Waste material from the catch basins **(WS #55)** and other off-specification explosives **(WS #1)** are presently managed in one of four permitted hazardous waste treatment units (TNHW-148) The treatment units are identical 5'x10' steel burn pans lined with compacted clay. The waste is placed on top of the clay liners and does not exceed a depth of 3 inches. The catch basin sludge is placed in one of four burn pans and allowed to dry. Once the waste explosives are dried, the waste is remotely ignited using an electric detonation device. *At the time of the inspection, no waste was in the burn pans.*

Ash removed from the treatment units is managed as a hazardous waste pending laboratory analysis as required in the permit. The residue has never failed LDR and is managed as a special waste at the on-site landfill. Periodically, clay is removed from the units and is analyzed prior to disposal at the on-site landfill if analysis confirms it is not a hazardous waste. The units are enclosed in an earthen berm located within double fences with warning signs, intruder alarms, guards and monitoring cameras. The unit area is graded ensuring all precipitation runs into a central point and is discharged to the IWWTP. Facility personnel are equipped with two-way radios. An operating log is maintained at the control trailer located in the permitted area. The log documents the accumulation and treatment of waste explosives. A daily inspection log is maintained for the permitted area and all required equipment. *All burn pans were replaced in September 2016. The quality of replaced units has come under scrutiny and currently all units are scheduled for replacement. A Class 1 Permit Modification was received November 1, 2018. Additionally, analytical results associated with the units (tested annually) were reviewed.*

Potentially explosive materials from the production buildings such as contaminated paper, plastic, and filter cloths are burned in two wire cages. Waste wood, potentially explosives contaminated waste oil generated in the explosive department, metal and plastic liners are burned in an open area. These potentially explosive materials are not hazardous waste, but are subject to recordkeeping requirements and impact sensitivity testing. The decontaminated metals are sold as scrap metal to recyclers and ash is tested for impact sensitivity and discarded as a special waste at the on-site landfill. ***Ash generated from the burning of potentially explosive waste must be analyzed and results submitted to DSWM prior to the next disposal event. The composition of plastics have changed since the initial waste characterization.***

Wastewater Treatment

All process water and wastewater, with the exception of domestic sewage, is treated at the on-site industrial wastewater treatment plant generating: (1) an effluent which is discharged to the

Holston River under NPDES Permit TN0003671 and (2) a sludge which was delisted as a hazardous waste (F003/F005/K044) on November 14, 1986. Small amounts of solvents generated in an on-site laboratory are included as part of the influent to the wastewater treatment plant. The dewatered sludge is managed as a special waste at the on-site landfill. HAAP also operates a treatment unit for their sanitary waste: this sludge is managed in the on-site landfill. Satellite accumulation areas are used to collect COD samples that are generated from wastewater testing in 20-gallon tubs. *One closed 20-gallon tub was present and properly labeled at the time of the inspection.*

Effective January 5, 2004 and updated July 14, 2011, the facility's IWWTF biological sludge management process plan became effective in lieu of the November 14, 1986 delisting approval for HAAP's IWWTF biological sludge. The plan addresses procedures for testing the IWWTF influent wastewater stream(s) and the resultant biological sludge for existing processes and new processes and for inadvertent introduction of characteristic and listed hazardous wastes into the wastewater influent. Quarterly sludge and annual process sampling results are submitted at the end of calendar year for the previous 12 month period. *Analytical results for the sludge were reviewed.*

Analytical Laboratory

Research and development, analytical, explosive, and environmental laboratories are housed in Building 8. Small amounts of reagents generated from testing are discharged to the industrial wastewater treatment plant through open drains. A catch basin is centrally located and settled solids **(WS #55)** are periodically sent to the permitted treatment units. Explosive contaminated materials, such as containers and paper towels, are bagged and transported to the permitted area and added to the treatment pile for destruction as needed. Waste explosives generated from the lab are accumulated in a 30-gallon satellite drum marked as containing non-conforming explosives. These explosives are added to the treatment units in the permitted area for destruction. *One satellite accumulation area containing a closed 30-gallon drum **(WS #55)** was present and labeled at the time of the inspection.*

Maintenance

Building 567 (Paint Shop) houses general maintenance and painting activities. A wheelabrator located behind B-567 is used for sandblasting small parts. There is an aerosol can puncture apparatus for depressurizing aerosol cans. *The container was closed and labeled.* Several of these devices are located throughout the facility and all spent and punctured cans are recycled. A paint booth is located in the rear of B-567. A water curtain collects paint residue, but has not generated any waste residue due to infrequent use. Spent solvent is collected in a 55-gallon satellite accumulation drum. When the satellite drum is full (about every 8-9 years), it is transported to the 90-day storage area and manifested for off-site disposal. *At the time of the inspection there was one satellite accumulation container properly labeled and closed.*

Building 556 (Automotive Repair Shop) contains used oil and oil filters generated during maintenance of machinery and government owned vehicles. Oil water separators are pumped annually or as required by Enterprise Oil. Small quantities of used oil generated throughout the

facility are staged in this building pending laboratory results. The used oil is then transferred to a bermed 2,500 gallon tank or handled as a hazardous waste. Used oil filters are drained for 12 hours and recycled through Enterprise Oil Company as is all used oil generated at the facility that is not potentially contaminated with explosives. Potentially explosive contaminated oil is tested and managed at the permitted area as waste oil. Portable filter draining stations contain integrated buckets (approximately 10 gallons) to collect used oil. Thirty-gallon containers are used to accumulate used oil inside of the shop. *All containers were labeled "Used Oil."* A small parts cleaner containing non-hazardous solvent is located inside Building 556 and serviced by Safety Kleen. An aerosol can depressurization unit is located in the building. *The container was closed and labeled.* Two containers of universal waste were observed in the shop area. *The containers were closed, labeled, and dated.*

Building 102 (Electric & Forklift Maintenance Shop) stores spent fluorescent lamps. *At the time of the inspection, all spent fluorescent lamps were properly contained, dated and labeled.* All spent lamps generated at the facility are recycled by Lighting Resources. Used oil is generated from maintenance work on transporters. One small parts cleaner uses Super Agitene solvent. Spent solvent is rarely generated, and is mixed with used oil in the 2,500 gallon tank at Building 556. The used oil tank is sampled prior to recycling by Enterprise Oil. *At the time of the inspection, four containers of used oil were observed in the shop. All containers of used oil were properly labeled.*

Building 200 (Steam Plant) and Building 219 (Steam Plant Maintenance Shop) generate used oil during daily operations. Containers of used oil and new oil are stored in Building 200. The storage area has designated areas for new oil and used oil. *At the time of the inspection, six 55-gallon drums of used oil were present in the storage area. The drums of used oil were labeled "Used Oil."* Two parts cleaners containing non-hazardous solvent are located behind Building 219 on a covered porch and serviced by Safety Kleen as nonhazardous waste. One aerosol can puncturing unit is located behind building 219. *The container was closed and labeled at the time of the inspection.*

Building 156 (Explosives Maintenance Shop) Maintenance is conducted on equipment that has possibly been exposed to explosive residue. There is a parts cleaner containing kerosene, but no waste has been generated to date.

Building 157 (pump shop) maintains pumps and equipment used in explosives manufacturing. The potentially contaminated equipment is first cleaned by high pressure water washing, then dipped in a sodium hydroxide trough adjacent to Building 157 to deactivate any residual explosive. After the sodium hydroxide bath, the equipment is then further decontaminated by burning in a decontamination oven and maintenance is performed as required. Oily rags potentially contaminated with explosives are collected and treated at the burn pile.

Behind *Building 157* there is a storage area for waste oil generated in the manufacturing area that is potentially contaminated with explosives. The waste oil is tested for PCB's, metals and VOC's. The waste oil is transported to the permitted area for burning on the burn pile. *Waste oil was not present at the time of the inspection.*

Building 142 (Diesel locomotive maintenance shop) is contractor run by Appalachian Railcar Services.

Medical Clinic is contracted through MH Health Care Services to provide limited medical services to employees. The clinic stocks twenty-seven prescription medications for dispensing, such as steroids, antibiotics, nicotine packaging, burn cream, epinephrine, and epi-pens, etc. Unadulterated out of date or recalled prescription pharmaceuticals are shipped to Med Flats (FLR000047467) in Florida. Vaccinations such as flu are administered on site. Sharps are managed by Evergreen in Atlanta, Ga.

Building 367 (Acid Plant Maintenance Shop.) Used oil and metal turning generated from machine maintenance are managed as potentially explosives contaminated waste.

Central Accumulation Area

Building T-2 (Containment Building) is inspected weekly as a 90-day area to accumulate hazardous waste prior to shipment. The building is used to store road salt, sawdust, and occasionally investigation derived waste pending analysis. *Building T-2 was quarantined and not inspected.*

Building 141 (90-day hazardous waste accumulation area.) The area is equipped with sealed concrete secondary containment, spill equipment, overpacks and an overhead sprinkler system. Operators carry radios when managing hazardous waste. Emergency phone numbers are posted on the outside of the building. *The inspection tag of the area fire extinguisher documented that the equipment has been inspected monthly. At the time of the inspection approximately 30 containers of hazardous waste were observed. The containers were closed, labeled "Hazardous Waste" and had an early accumulation start date of 3-2-19.*

The storage area is also used to store product and investigative derived waste groundwater. Hexamine and acetic acid for explosives production is mixed in a separate area of the building.

Area A Manufacturing

The weak acetic acid recovered from the washing/filtering of the crude explosives is pumped to Area A where it is concentrated by azeotropic distillation with n-propyl acetate. The n-propyl acetate reacts with formic acid impurities in the acetic acid to form n-propyl formate, which affects the efficiency of the process. When the still is in operation, the stream containing n-propyl formate is continuously discharged to the industrial wastewater treatment plant at Area B at a rate of approximately 0.25 gpm.

The refining of crude acetic anhydride generates a carbon char sludge that is processed in a ball mill to allow separation and recovery of the anhydride portion of the sludge. The sludge is washed from the ball mill into a concrete basin to allow settling of the sludge. The water flows through to another wastewater treatment basin. The sludge is collected in a hopper and a pH determination is made. The carbon solids are disposed of as a special waste in the on-site landfill at Area B.

Building 34A (maintenance shop) houses one parts cleaner containing mineral spirits. When the parts cleaner is changed (rarely), spent mineral spirits are added to the used oil (tested for characteristics) which is stored in Building 41. *At the time of the inspection, no used oil was present.*

Building 505A (paint shop) does limited painting with oil-based and latex paints. There is a properly labeled aerosol can puncture apparatus for depressurizing aerosol cans. There is a designated area for drying RCRA empty paint buckets in the shop and posted procedures for emptying paint buckets.

Building 4A (electrical shop) stores universal waste batteries and fluorescent bulbs. *At the time of the inspection, two containers of spent batteries were observed. The containers were closed, labeled, and dated. Four containers of universal waste bulbs were present at the time of the inspection. The containers were closed and labeled.* ***Two containers of spent bulbs located in Building 4A at Area A had accumulation start date of 7-27-2016 and 2-12-2018. Two containers of spent bulbs located in Building 4A at Area A were not dated and the accumulation time could not be determined.***

Building 41 houses centralized used oil collection for Area A. *At the time of the inspection there was one closed 55-gallon container labeled used oil.*

Corrective Action

Several solid waste management units (SWMUs) and areas of concern (AOCs) are located on the 6,000 acre site.

Area B SWMUs and AOCs

SWMU 77, 78, 86, 87 – Pesticide mixing building 148,
SWMU 88 – Pesticide washdown area
SWMU 18 – Closed sanitary landfill
SWMU 25 – Tarpit landfill
SWMU 19, 29 – Sediment pond on top of construction debris landfill
SWMU 20 – Rock quarry landfill
SWMU 21 – Rock dam landfill
SWMU 24 – Coal tar and flyash landfill
SWMU 22, 28, 38, 39 – Flyash landfill
SWMU 26 – Closed landfill
SWMU 109 – Coal tar
SWMU 44 – Old burn area
SWMU 47 – Burn pile area
SWMU 27, 56 – Coal tar and flyash with active sedimentation pond
SWMU 37 – Nitric acid spill pond
SWMU 3 – Catch basins
SWMU 110 – New source at E-4 undergoing corrective measures for clean closure
SWMU 23 – Old flyash landfill
AOC N – Hydraulic leak under Building G-2

Area A SWMUs

SWMU 96 – Coal tar
SWMU 103 – Coal tar
SWMU 4 – Coal tar
SWMU 14 – Coal tar
SWMU 10 – Coal tar

Facility File Review:

The following records were reviewed during the inspection:

1. The weekly inspection checklist for the Building T-2 and Building 141 hazardous waste 90-day accumulation area was reviewed.

2. Daily operating records for hazardous waste tanks 14, 15, 17, and 20 were reviewed.

3. Daily inspection records for hazardous waste tanks 14, 15, 17 and 20 were reviewed.

4. The contingency plan was reviewed. Evacuation procedures are addressed in the Site Evacuation Plan.

5. Hazardous waste manifests from June 2018 to present were reviewed. Land Disposal Restriction notifications for the shipments were reviewed.

6. RCRA and DOT training was reviewed. RCRA and DOT training was current.

7. The 2018 hazardous waste annual report was reviewed. The facility notified as a large quantity generator.

8. The Hazardous Waste Reduction Plan was recently reviewed.

9. Inspection records for the hazardous waste 90-day area deluge system and sprinkler system were reviewed. Yearly inspections are conducted on the equipment. Monthly inspections are conducted at most buildings to inspect safety equipment (including fire extinguishers).

Other Records Reviewed:

The following records associated with Hazardous Waste Permit TNHW-148 were reviewed:

1. Waste analytical for WWTP sludge, annual process wastewater streams, and treatment unit residue.

2. Employee training for operating personnel.

3. The inspection log for the permitted area.

4. The operational log (contaminated explosives log book) for the permitted area.

5. Inspection logs for the temporary accumulation areas located in the magazine area.

6. Analytical results for waste oil generated from the production area and burned on the burn pile were reviewed.

VIOLATIONS: The following violation was identified during this compliance evaluation inspection:

Violation #1 – 0400-12-01-.12(2)(f)1. states:

(2) Standards for Small Quantity Handlers of Universal Waste

(f) Accumulation Time Limits

1. A small quantity handler of universal waste may accumulate universal waste for no longer than one year from the date the universal waste is generated, or received from another handler, unless the requirements of part 2 of this subparagraph are met.

Violation #1 Observation:

At the time of the April 3, 2019 inspection two containers of spent bulbs located in Building 4A at Area A had accumulation start date of 7-27-2016 and 2-12-2018.

Violation #2 – 0400-12-01-.12(2)(f)3. states:

(2) Standards for Small Quantity Handlers of Universal Waste

(f) Accumulation Time Limits

3. A small quantity handler of universal waste who accumulates universal waste must be able to demonstrate the length of time that the universal waste has been accumulated from the date it becomes a waste or is received. The handler may make this demonstration by:

(i) Placing the universal waste in a container and making or labeling the container with the earliest date that any universal waste in the container became a waste or was received;

(ii) Marking or labeling each individual item of universal waste (e.g., each battery or thermostat) with the date it became a waste or was received;

(iii) Maintaining an inventory system on-site that identified the date each universal waste became a waste or was received.

(iv) Maintaining an inventory system on-site that identified the earliest date that any universal waste in a group of universal waste items or a group of containers of universal waste became a waste or was received;

(v) Placing the universal waste in a specific accumulation area and identifying the earliest date that any universal waste in the area became a waste or was received; or

(vi) Any other method which clearly demonstrates the length of time that the universal waste has been accumulated from the date it becomes a waste or is received.

Violation #2 Observation:

The accumulation time for two containers of spent bulbs located in Building 4A at Area A could not be determined.

REMARKS / RECOMMENDATIONS:

Hazardous Waste Storage Tank Inspections.

Date should be documented on inspection logs when waste is removed from the tank. Units of waste measurement should also be documented on the inspection logs.

Ash from solid waste burn pile and cages.

The ash generated from the burn pile (operating under Title V air permit) should be analyzed and results submitted to the Johnson City Field Office DSWM. Although the ash is included as an approved special waste in the landfill permit, the composition of material burned has changed since the initial analysis was conducted. The results must be submitted and evaluated by DSWM prior to the next disposal.

Signed _____ Dated 4-8-2019
John C. Webb, P.E.
Environmental Consultant 2
Division of Solid Waste Management
Johnson City Environmental Field Office

Signed _____ Dated 4-8-2019
Beth Glynn, CHMM
Environmental Consultant I
Division of Solid Waste Management
Johnson City Environmental Field Office

Reviewed _____ Dated 4-8-19
Chris Lamb
Environmental Field Office Manager
Division of Solid Waste Management
Johnson City Environmental Field Office

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

FEB 10 2016

Mr. Joseph Kennedy
Commander's Representative
Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, Tennessee 37660

SUBJ: Compliance Evaluation Inspection
Holston Army Ammunition Plant
EPA ID No.: TN5 210 020 421

Dear Mr. Kennedy:

On December 9-10, 2015, a compliance evaluation inspection (CEI) was conducted by the U.S. Environmental Protection Agency and the Tennessee Department of Environment and Conservation (TDEC) at the Holston Army Ammunition Plant located in Kingsport, Tennessee, to determine the facility's compliance status with the Resource Conservation and Recovery Act (RCRA).

Enclosed is the EPA RCRA Inspection Report, which indicates deficiencies of RCRA regulations were discovered at the time of the inspection. A copy of this report has been forwarded to the TDEC.

If you have any questions concerning the inspection report, please contact William Kappler, of my staff, at (404) 562-8498 or by email at kappler.william@epa.gov.

Sincerely,

Héctor M. Danois
Acting Chief, Hazardous Waste Enforcement and Compliance Section
Enforcement and Compliance Branch
Resource Conservation and Restoration Division

Enclosure

cc: Billy Shelton, BAE
Ashley Holt, TDEC/Nashville
John Webb, TDEC/Johnson City

RCRA Inspection Report

1) Inspector and Author of Report

William Kappler
Environmental Scientist
RCRA & OPA Enforcement and Compliance Branch
Environmental Protection Agency, Region 4, AFC - 10th Floor
61 Forsyth Street
Atlanta, Georgia 30303
(404) 562-8498

2) Facility Information

Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, Tennessee 37660
Hawkins County

EPA ID No.: TN5 210 020 421

Mailing Address
4509 West Stone Drive
Kingsport, Tennessee 37660

3) Responsible Officials

Mr. Joseph Kennedy
Commander's Representative

Primary Contact
Mr. Paul Bailey
Environmental Affairs Specialist
BAE Systems Ordnance Systems, Inc.
Telephone: (423) 578-6298

4) Inspection Participants

Billy Shelton, BAE Systems Ordnance Systems Inc.
Paul Bailey, BAE Systems Ordnance Systems Inc.

Amy Crawford, BAE Systems Ordnance Systems Inc.
Beth Glynn, Tennessee Department of Environment and Conservation
John Webb, Tennessee Department of Environment and Conservation
Ken Feely, Environmental Protection Agency, Region 4
Javier Garcia, Environmental Protection Agency, Region 4
William Kappler, Environmental Protection Agency, Region 4

5) **Date and Time of Inspection**

December 9-10, 2015, at 1:30 p.m.

6) **Applicable Regulations**

Tennessee Hazardous Waste Management Act, T.C.A. 68-212-101 etseq.; the Tennessee Hazardous Waste Reduction Act, T.C.A 68-212-301 etseq.; [Resource Conservation and Recovery Act Sections 3002 - 3005, (42 U.S. Code - Annotated U.S.C.A. 6925 and 6927)], the Tennessee Hazardous Waste Management Regulations, Tennessee Rule Chapter 0400-12-01 [40 Code of Federal Regulation (C.F.R.) Parts 260-270, 273 & 279], and the Tennessee Department of Environment and Conservation, conditions of Open Burn Treatment Permit #TNHW-148.

7) **Purpose of Inspection**

On December 9-10, 2015, inspectors from the U.S. Environmental Protection Agency, Region 4, and the Tennessee Department of Environment and Conservation (TDEC) conducted an unannounced compliance evaluation inspection (CEI) at Holston Army Ammunition Plant, (hereinafter, "HAAP" or the "facility") to determine its compliance status with the RCRA and the State of Tennessee regulations. This was an EPA-lead inspection. Inspectors arrived at HAAP on December 9, 2015, at 1:30 p.m. and were greeted by Mr. Billy Shelton and Mr. Paul Bailey, of BAE Systems Ordnance Systems Inc., the contractor for HAAP. Inspectors were escorted to a conference room for an entrance briefing. The inspectors conducted a formal introduction, showed credentials and explained the purpose of the visit.

8) **Facility Description**

HAAP is a Government Owned/Contractor Operated (GOCO) facility, owned and operator by the United States Army. BAE Systems Ordnance Systems Inc., (BAE) is responsible for the day-to-day environmental operations and has been at this site since 1999. BAE is in a 25 year contract with the U.S. government. HAAP is located at 4509 West Stone Drive, Kingsport, Hawkins County, Tennessee. The facility has been at this location since 1942. The property consists of 6,000 acres within a valley between two mountain ranges. The property is owned by the U.S. Army. The facility employs approximately 698 people and operates 24 hours a day 7 days per

week. The City of Kingsport supplies the potable water and domestic waste is serviced by an on-site domestic wastewater treatment facility, with the effluent discharged to the Holston River. HAAP also operates an industrial waste water treatment plant. Process water used in the operation is pumped from the Holston River and from the ground. The primary NAICS code for the facility is 32592. The manufacturing operation is composed primarily of the Manufacturing Area B and the Manufacturing Area A. The majority of the explosive manufacturing is conducted in Manufacturing Area B, which consists of numerous buildings constructed in 10 linear process lines. The buildings are titled alphabetically, beginning with the letter "D" and continuing primarily in alphabetically sequence. HAAP was inspected as a large quantity generator (LQG), universal waste handler, used oil generator and a permitted Treatment, Storage or Disposal facility (TSDF). The facility thermal treats hazardous waste (D003 and K044) in 4 Subpart X open burn miscellaneous treatment units (Burn Pan Units).

The TDEC issued HAAP the RCRA permit (Hazardous Waste Permit TNHW-148) on April 11, 2011. The permit became effective on March 31, 2011, and it expires on March 31, 2021. The permitted hazardous waste units consist of four ¼ inch-thick steel burn pans at 4 feet 10 inches wide by 20 feet long by 1 foot deep. The permit limits the treatment of no more than 5,000 pounds of net explosive weight (NEW) of reactive hazardous waste per day. The permit limits the treatment of a maximum of 1,500 pounds of NEW of reactive hazardous waste in any one burn pan. HAAP open burns non-hazardous waste personal protective equipment (PPE) generated from the process operation in two wire cage units located outside of the permitted area. The facility utilizes an open burn area, also located outside the permitted area, when needed.

9) **General Process Description**

HAAP manufactures explosives and explosive formulations. The facility consists of two manufacturing areas, explosive storage magazines, industrial landfill, an industrial wastewater treatment plant and a permitted treatment area.

The explosive formulations are made by batch process. The principal explosives manufactured at HAAP consist of cyclotrimethylene trinitramine (RDX) and cyclotetramethylene tetranitramine (HMX). RDX and HMX are used to make several explosive formulations and products used in bombs, rockets, mines and in C-4 block. Raw materials (acetic acid, nitric acid, ammonium nitrate, acetic anhydride and hexamine) are received in bulk in containers, super-sacks and tankers. The materials are pumped from Buildings 151 and 330 to the process line, which begins in Building D. In Building D, nitrification of the raw materials produces acid slurry of the crude explosive. The acid slurry is washed in Building E to remove the acid. Some of the dilute acid is returned to Building D for reuse. The remaining acid is piped to the primary distillation line (acid recovery Building B-3) where any remaining explosives are recovered and returned to Building E.

The recovered acid is pumped to Manufacturing Area A for reprocessing into glacial acetic acid or acetic anhydride. Still bottoms consisting of ammonium nitrate and amine nitrates at 55-65% are generated during the distillation of the acetic acid. The still bottoms is sold to MSI as product to make commercial explosives for the mining industry. The raw explosive and water slurry is pumped to Building G and is partially dissolved in a solvent (acetone, cyclohexanone) and recrystallized. The type of solvent used depends on which explosive is being manufactured.

The recrystallized explosive, which remains in a water slurry, is pumped to Building H and dewatered. Wastewater generated from this process is piped to the on-site industrial wastewater treatment plant. The wet recrystallized explosive is next transferred to various Buildings L through N as needed for incorporation to produce specific formulations. The formulated explosive product is dried and is packaged for shipment or storage.
Wastewater containing explosive solids generated from the dewatering process and from building and equipment cleaning, etc. are settled in baffled catch basins located at each production building. The waste explosive solids are removed from each catch basin once per week and accumulated in a container located outdoors near each catch basin. Non-hazardous waste contaminated PPE is also accumulated in a container in these areas. The waste explosives are transported weekly to the permitted area for treatment.

Steam required to operate the process is generated by coal-fired boilers located in Manufacturing Area B. The coal cinders are recycled by Clinch Mountain Materials for use in cinder block production. Fly ash is disposed of in the on-site Bays Mountain Class II Solid Waste Landfill at Manufacturing Area B.

Waste solvent generated from batch production of the explosives is stored in a tank for further use. If the waste solvent cannot be reused, it is pumped directly to a transport vehicle and managed as a hazardous waste after exiting the process tank.

DMSO is also manufactured at the facility. Waste DMSO generated from production is typically placed into a tanker truck for shipment offsite to a TSDF.

Previous Inspection History

HAAP was last inspected by TDEC on July 28, 2015, and was not in compliance with the RCRA regulations at that time. The RCRA deficiencies were corrected by HAAP at the time of the inspection. TDEC conducted a follow-up inspection on September 19, 2015, and additional documentation was submitted to TDEC, returning the facility to compliance. HAAP was last inspected by EPA on September 19, 2011, and was not in compliance with the RCRA regulations at that time.

10) Findings

The information in this RCRA Inspection Report is based on the EPA's December 9-10, 2015, RCRA Compliance Evaluation Inspection and documentation submitted by HAAP via email receipt on December 10, 15, and 16, 2015.

RCRA Permitted Treatment Units

HAAP is permitted to treat waste solids (D003/K044) from the settling of process water through building catch basins and waste explosives (D003) from the manufacture of RDX and HMX in one of four permitted hazardous waste treatment units (burn pans). The catch basin sludge is placed in one of four clay-lined units and allowed to dry. Once the waste explosives are dried, the waste is remotely ignited using an electric detonation device. Ash removed from the treatment units is managed as a hazardous waste pending laboratory analysis as required in the permit. Non-hazardous waste ash is managed as a special waste at HAAP's industrial waste landfill (ILD 37-104-00909). Waste clay removed from the units on occasion, is analyzed prior to disposal at the facility's industrial landfill if analysis confirms it is not a hazardous waste. The units are enclosed in an earthen berm located within double fences with warning signs, intruder alarms, guards and monitoring cameras. The unit area is graded ensuring all precipitation runs into a central point and is discharged to the industrial wastewater treatment plant. Facility personnel are equipped with two-way radios. An operating log is maintained at the control trailer located in the permitted area. The log documents the accumulation and treatment of waste explosives. A daily inspection log is maintained for the permitted area and all required equipment. Analytical results for treatment unit residue (tested annually) is also maintained for review.

Potentially explosive materials from the production buildings such as contaminated paper, plastic, and filter cloths are burned in two wire cages. Waste wood, explosives contaminated waste oil generated in the explosive department, metal and plastic liners are burned in an open area. These potentially explosive materials are not hazardous waste, but are subject to recordkeeping requirements and impact sensitivity testing. The decontaminated metals are sold as scrap metal to recyclers and ash is tested for impact sensitivity and discarded as a special waste at HAAP's class II solid waste landfill.

At the time of the inspection, treatment units 1 and 2 were accumulating waste explosive for treatment (photographs 1 and 2). The treatment units were closed. Inspectors observed treatment units 3 and 4 accumulating treated residue and ash (photographs 3 and 4). The treatment units were closed.

The central storm drain and the storm drains adjacent to each treatment unit appeared to contain a build-up of sediment and gravel, which could impede the drainage of precipitation (photographs 7 through 9).

Also, inspectors observed the treatment unit area needed some re-grading with gravel to manage precipitation run-off.

Pursuant to Tennessee Rule Chapter 0400-12-01 [40 Code of Federal Regulation (C.F.R.) Part 270], and the Tennessee Department of Environment and Conservation, conditions of Open Burn Treatment Permit #TNHW-148, HAAP is required under Section II, General Facility Conditions, Subsection E, Paragraph 1 to conduct inspections, which states: The permittee shall inspect the facility for malfunctions and deterioration, operator errors, and discharges which may be causing or may lead to (1) a release of hazardous waste or hazardous constituents to the environment or (2) a threat to human health. The permittee shall inspect each listed item on the inspection form(s) in Attachment 4. The inspection type and frequency shall be in accordance with Attachment 4.

Accumulating sediment and rock in the permitted area storm drains. Weekly inspection requirement in Attachment 4, Inspection Checklist, Figure 4-1, page 2 of 4 (on page 4-6) Inspection Item – "Drop Inlets for Storm Waters", Type of Problem – "Presence of Obstructions". Page 4-3 under Testing and Maintenance of Equipment states: The drainage system and vegetation control will be checked weekly. Maintenance activities will generally consist of repair of damage, removal of unwanted vegetation, and only under extremely unusual situations, replacement of drainage components, depending on the extent of damage.

Erosion of gravel and rock in the general permitted area. Same checklist as 1 above, inspection item being "Gravel Surface" Type of Problem - "gravel in place". Page 4-3 under Testing and Maintenance of Equipment states: Engineered structures (berms, clay liners, and cleanup of treatment residue) will be checked weekly. Maintenance activities will generally consist of repair of damaged sections and, only under extremely unusual situations, complete replacement, depending on the extent of damage.

Inspectors also observed one 55-gallon container accumulating investigative derived waste. Inspectors requested that the container be removed for disposal.

Building T-2 (Containment Building)
The area is used to store road salt, sawdust, and occasionally investigation derived waste pending analysis. At the time of the inspection, there was no hazardous waste accumulating in this area.

Building 141 - Central 90-Day or Less Accumulation Area
The area is equipped with a sealed concrete secondary containment, spill equipment, over packs and an overhead sprinkler system. Eye wash and overhead shower units appeared in good condition. Emergency phone numbers are posted on the outside of the building. Inspectors observed 6 55-gallon containers, 2 20-gallon containers and one over-pack container

accumulating hazardous waste. The containers were closed, in good condition with sufficient aisle space, labeled with the words hazardous waste and all marked with a date in September 2015.

Inspectors observed several containers of chemical material stored next to the containers of hazardous waste. The chemical material are products used by the Analytical Laboratory. Inspectors requested that additional space be provide between the containers of chemical material and containers of hazardous waste.

Manufacturing Area B

Ten process lines are located within Area B, but at the time of the inspection four lines were operating. The number of active buildings can vary depending on the process operation. The acids and solvents used in the process are delivered using a closed-loop system and are returned to the process tanks located in Manufacturing Area A.

Nitrification Process - Building D-5

The raw chemicals, which consist primarily of acetic acid, acetic anhydride, nitric acid, ammonium nitrate, and hexamine are mixed in a nitrification process in stainless steel tanks constructed in vertical succession between the building floors. The chemicals are pumped to a head tank located on the upper floor. The chemicals are delivered to each successive tank by gravity flow until it is delivered as a non-explosive acid slurry in the bottom tank located on the bottom floor. There are no tank bottoms generated from this process operation. Maintenance on each tank is conducted as needed. The raw explosive in the form of an acid slurry is next pumped to Building E for washing.

Each active manufacturing building has a satellite accumulation area located outdoors located near a wastewater catch basin. The catch basins are approximately 6 feet deep. Located outdoors on an asphalt pad inspectors observed one 33-gallon container accumulating hazardous waste solids from the catch basin and labeled with the words Waste Explosive (D003, K044), one large trash container accumulating personnel protective equipment (PPE) and labeled with words Contaminated Waste and one 5 to 10-gallon container of oily rags. All containers were closed. The waste PPE and oily rags are non-hazardous waste and thermally treated in the wire cage units.

Washing Process - Building E-3

The acid slurry is washed (HMX with warm water and RDX with cold water) in Building E to remove the acid. Some of the dilute acid is returned to Building D for reuse. The remaining acid is piped to the primary distillation line for acid recovery (Building B-3) where any remaining explosives are recovered and returned to Building E.

Located outdoors on an asphalt pad inspectors observed one 33-gallon container accumulating hazardous waste solids from the catch basin and labeled with the words Waste Explosive (D003, K044) and one 55-gallon container accumulating PPE labeled with words Contaminated Waste. All containers were closed.

Cooking and Recrystallization Process - Building G-5

Intermediate formulations are delivered in a "Nutsche". The Nutsche is a transport vehicle designed to minimize explosive sensitivity. The plastic explosive and the acid slurry is also delivered to Building G for processing to make an explosive material that resembles oatmeal. The acid slurry is first pumped to a dissolver tank and cooked with a solvent (acetone, cyclohexanone) and cooked again in a series of coils. The cooked acid slurry is steam cooked to remove the remaining solvent. The solvent is recovered directly using specialized filter bags for reuse. The spent filter bags are non-hazardous waste. The oatmeal material is next pumped to Building H for screening/dewatering.

Located outdoors on an asphalt pad inspectors observed one 33-gallon container accumulating hazardous waste solids from the catch basin and labeled with the words Waste Explosive (D003, K044). The container was closed.

Screening/Dewatering Process - Building H-5

This process was not operating in this building at the time of this inspection. All H buildings were closed for maintenance at the time of this inspection.

Located outdoors on an asphalt pad inspectors observed 2 33-gallon containers accumulating hazardous waste solids from the catch basin and labeled with the words Waste Explosive (D003, K044). One container was full and the second container had begun to accumulate a small amount of hazardous waste. The full container was scheduled for pick-up for transfer to the 90-day or less area. The containers were closed.

Hazardous Waste Tank Farm – Building E-10

Several storage tanks are located at Building E-10. The tanks have a 40,000 gallon capacity and have coated concrete secondary containment. The area of the tanks is equipped with emergency equipment. At the time of the inspection tank 15 was empty. Tank 13 was accumulating industrial wastewater for treatment at the IWWTP. Tank 16 was accumulating non-hazardous waste. Tank 17 was accumulating spent nitric acid. All the tanks were labeled with the words hazardous waste.

Hazardous Waste Tank Farm – Building E-4

One additional storage tank (number 14) is located at Building E-4. The tank has a 40,000 gallon capacity and a coated concrete secondary containment. The area of the tank is equipped with

emergency equipment. The tank normally is accumulating Waste NQ mother liquor from nitroguanidine production (D002). At the time of the inspection tank 14 was empty.

Finishing and Packing - Building L-6
The RDX and HMX wet explosive is next transferred to Buildings L through N as needed to produce specific explosive formulations. At the time of this inspection the wet explosive was being managed for finishing and packaging in this building. Additional water or alcohol is added to the wet explosive for moisture and preservative requirements.
The explosive is next packaged, weighed, finish packaged and screened through a metal detector.

Located outdoors on an asphalt pad inspectors observed one 33-gallon container accumulating hazardous waste solids from the catch basin and labeled with the words Waste Explosive (D003, K044) and one 33-gallon container accumulating PPE labeled with words Contaminated Waste. All containers were closed.

Maintenance

Explosive Maintenance Shop – Building 156
This area repairs equipment used in the manufacturing process. Oily rags are accumulated and treated in the burn pile located at the permitted area. Inspectors observed a parts washer containing kerosene that is blended with the used oil when spent or with sawdust and burned.

Used Oil Accumulation Area – Building 157
Behind Building 157 there is a storage area for waste oil generated in the manufacturing area that is potentially contaminated with explosives. The waste oil is tested for metals and VOC's. The waste oil is mixed with sawdust then transported to the permitted area for burning on the burn pile. Inspectors observed several 55-gallon containers accumulating used oil. The containers were closed and labeled with the words "Waste Oil". TDEC has approved the use of the words Waste Oil due to the possibility of the used oil contaminated with explosive residue.

Paint Shop – Building 567
The Paint Shop houses general maintenance and painting activities. Inspectors observed one 55-gallon container accumulating waste paint and solvent and one 55-gallon container accumulating waste aerosol cans. The containers were closed and labeled with the words hazardous waste.

A paint booth is located in the rear of this building. A water curtain collects paint residue, but has not generated any waste residue due to infrequent use.

A part blaster located outdoors on a concrete pad and under a metal roof behind building 567 is used for blasting small parts. No waste has been generated for at least 3 years. Inspectors

observed a release of sandblast material under the unit onto the concrete pad. Inspectors requested the facility to respond to the release. A review of the SDS for the blast material, "Black Beauty" indicates it is not a hazardous waste in its product form.

Industrial Waste Water Treatment Plant – Building 235
All process water and wastewater, with the exception of domestic sewage, is treated at the on-site IWWTP. The effluent is discharged to the Holston River under NPDES Permit No.: TN0003671. Waste sludge was delisted as a hazardous waste (F003/F005/K044) on November 14, 1986. Small amounts of solvents generated in the Analytical Laboratory are included as part of the influent to the IWWTP. The dewatered sludge is mixed with cinders generated from the boilers as a bulking agent and managed as a special waste at HAAP's on-site industrial waste landfill (ILD 37-104-00909).

Industrial Waste Water Treatment Plant Laboratory – Building 235
Several laboratory analytical procedure are conducted on the industrial wastewater including COD. Inspectors observed one 20-gallon container in the laboratory accumulating waste COD vials. The container was closed and labeled with the words hazardous waste. No hazardous waste was observed generating in the pilot laboratory adjacent to the main laboratory.

Health Clinic
The health clinic utilizes a dispensary, which is stocked with over-the-counter (OTC) and prescription pharmaceuticals. The majority of pharmaceutical consist of OTC tablets, which are given to the patient in full packaging. The health clinic dispenses some vaccines. A review of the MSDS/SDS for the vaccines indicate that some of the vaccines contain "Thimerosol" as an ingredient. Partially used and unused pharmaceutical vaccines containing this ingredient may be a hazardous waste when disposed. The facility should develop and implement a regulatory management system for pharmaceuticals generated as a solid waste to determine if it is a hazardous waste. The health clinic uses Medflats (FLR000047467) to manage pharmaceutical returns.

Research and Development Analytical Laboratory – Building 8
Research and development, analytical, explosive, and environmental laboratories are housed in Building 8. Small amounts of reagents generated from testing are discharged to the industrial wastewater treatment plant through open drains. A catch basin is centrally located and settled solids are accumulated as hazardous waste outdoor next to the catch basin. Located outdoors on an asphalt pad inspectors observed one 33-gallon container accumulating hazardous waste solids from the catch basin and labeled with the words Waste Explosive (D003, K044). The container was closed.

11) Waste Management Practices

Hazardous waste is managed in containers in satellite accumulation areas at or near locations where the waste is generated. Full containers are transferred to the 90-Day or Less Accumulation Areas. BAE staff prepares the hazardous waste for packaging and onsite management, prior to shipping the hazardous waste offsite to an offsite TSDF. Hazardous waste explosives are transported weekly to the permitted area for treatment.

Hazardous waste is also managed two 90-day or less storage tanks located at the Building E-10 tank farm one 90-day or less storage tank located at Building E-4 tank farm. Shipments of hazardous waste from the tanks are transported by tanker truck to an offsite TSDF.

HAAP used the following transporters in 2015
Heritage Transport, LLC – IND 058 484 114

HAAP used the following TSDFs in 2015
Heritage Environmental Services, LLC – IND 093 219 012

12) Record Review

RCRA Permit
The RCRA permit was maintained at the facility.

Permitted Unit Records
Inspectors reviewed the burning ground records for waste explosives from July 28, 2015, to December 9, 2015 (Burn Numbers 24 through 45), the daily inspection log, the operational log, weather station calibration records, the permitted area soil sampling plan, the burn pan impact result records and explosive residue laboratory analysis records for 2014 and 2015.

Manifests
Inspectors reviewed manifests for the offsite shipment of hazardous waste from January 1, 2015, to the present. Numerous hazardous waste manifests were reviewed by EPA and TDEC inspectors.

Waste Analysis
Inspectors reviewed waste analysis and MSDS/SDS for several waste streams at the time of the inspection. Inspectors also reviewed the 2014 biosludge and process water waste analysis reports.

Contingency Plan
HAAP maintains a contingency plan and it was reviewed at the time of the inspection.

Arrangements with Local Authorities
The facility documented arrangements made with the state and local authorities and with an emergency response contractor and equipment supplier.

90-Day or Less Weekly Container Inspection Records
The facility documents weekly inspection of containers of hazardous waste in the 90-Day or Less Accumulation Area. Inspectors reviewed weekly inspection logs dated from January 1, 2015, to the date of this inspection.

Daily Tank Inspection Records
The facility maintains the daily inspection records. Inspectors reviewed the inspection records from January 1, 2015 to the date of the inspection.

Daily inspection records for hazardous waste tanks 14, 15 and 17 were reviewed. It appears the facility did not document the daily inspection for tank 17 on September 23, 2015. The facility submitted an inspection record for tank 17 on January 21, 2016.

Hazardous Waste Tank Assessment and Certification
Inspectors reviewed tank certification records for Tank No.: 14, Tank No.: 15, and Tank No.: 17. The tanks have a 40,000 gallon capacity were certified for use in March 4, 2013, April 19, 2013, and September 6, 2013, respectively.

Personnel Training
Hazardous waste training records for 2014 and 2015 were reviewed for employees assigned to the permitted area and other randomly selected individuals at the facility.

RCRA Organic Air Emission Records
The air emission standards for tanks and containers were reviewed.

Hazardous Waste Annual Report
HAAP submitted a hazardous waste annual report dated February 23, 2015, to TEDC.

Hazardous Waste Reduction Plan
A hazardous waste reduction plan was maintained at the facility.

Hazardous Waste Minimization Report
A waste minimization plan was maintained at the facility.

Land Disposal Restriction Notice
The land disposal restriction documents are maintained and were reviewed at the time of the inspection.

13) Out-Briefing

Upon conclusion of the inspection, an exit interview was conducted in the presence of Holston Army Ammunition Plant representatives. The facility was informed of the findings at the time of the inspection.

14) Sampling Overview

Sampling was not conducted at this facility.

15) Conclusion/Summary of Violations

Based on the Compliance Evaluation Inspection conducted on December 9-10, 2015, the Holston Army Ammunition Plant was not in compliance with the regulations at the time of this inspection.

16) Signed

William Kappler — Date: 2/10/16
Physical Scientist
Hazardous Waste Enforcement and Compliance Section

17) Concurrence

Héctor M. Danois — Date: 2-10-16
Acting Chief, Hazardous Waste Enforcement and Compliance Section
Enforcement and Compliance Branch

Holston Army Ammunition Plant

Kingsport, TN

TN5 210 020 241

EPA CEI Pictures

December 9 and 10, 2015

Picture 1: Holston Army Ammunition Plant – December 9, 2015 at 3:49 P.M. View of untreated waste in Pan 1 of the permitted Burning Ground unit. – Picture taken by Javier Garcia.

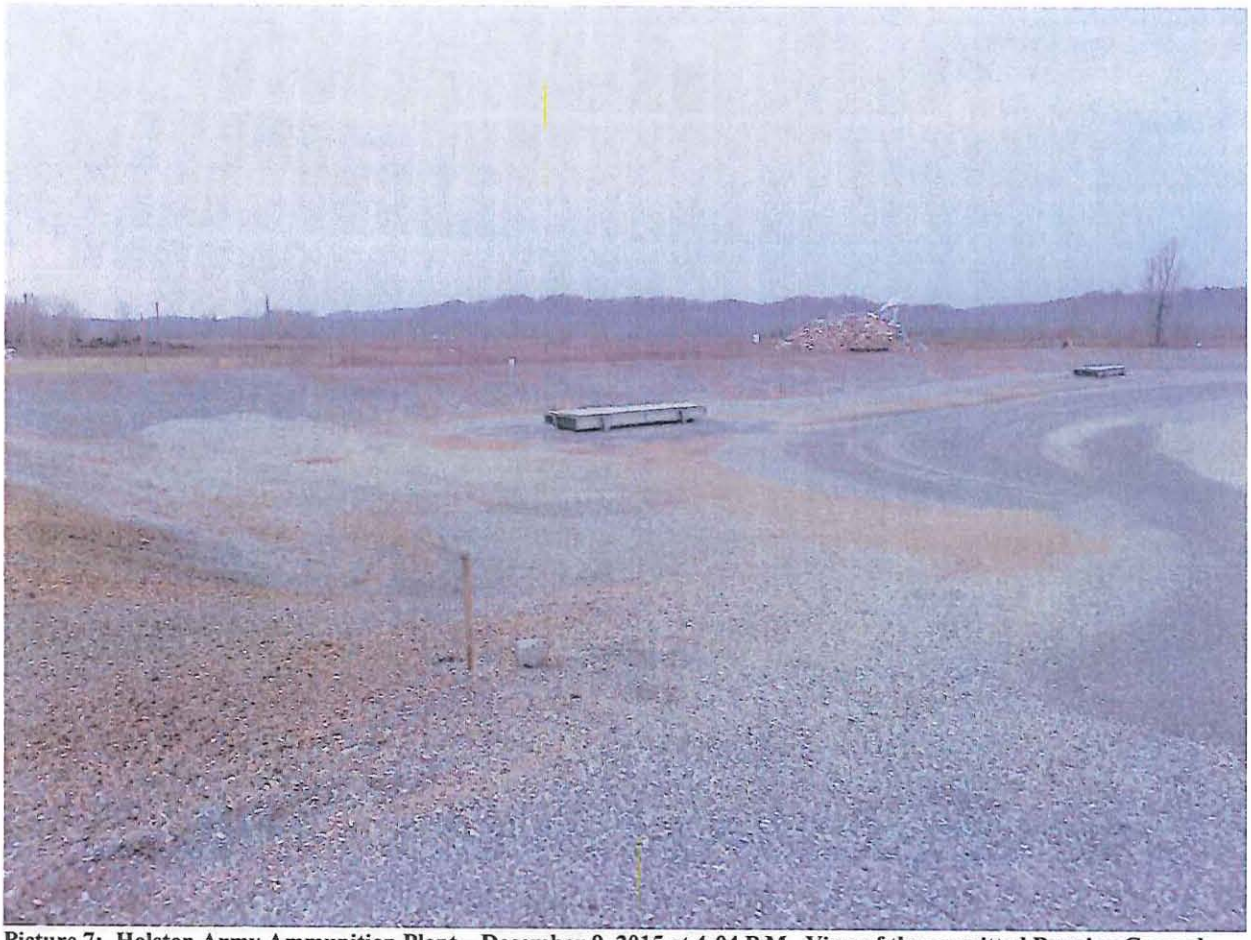
Picture 2: Holston Army Ammunition Plant – December 9, 2015 at 3:53 P.M. View of untreated waste in Pan 2 of the permitted Burning Ground unit. – Picture taken by Javier Garcia.

Picture 3: Holston Army Ammunition Plant – December 9, 2015 at 3:59 P.M. View of Pan 4 in the permitted Burning Ground unit with residue from open burning treatment – Picture taken by Javier Garcia.

Picture 4: Holston Army Ammunition Plant – December 9, 2015 at 4:00 P.M. View of Pan 3 in the permitted Burning Ground unit with residue from open burning treatment – Picture taken by Javier Garcia.

Picture 5: Holston Army Ammunition Plant – December 9, 2015 at 4:00 P.M. Storm water collection point near Pan 3 of the permitted Burning Ground. – Picture taken by Javier Garcia.

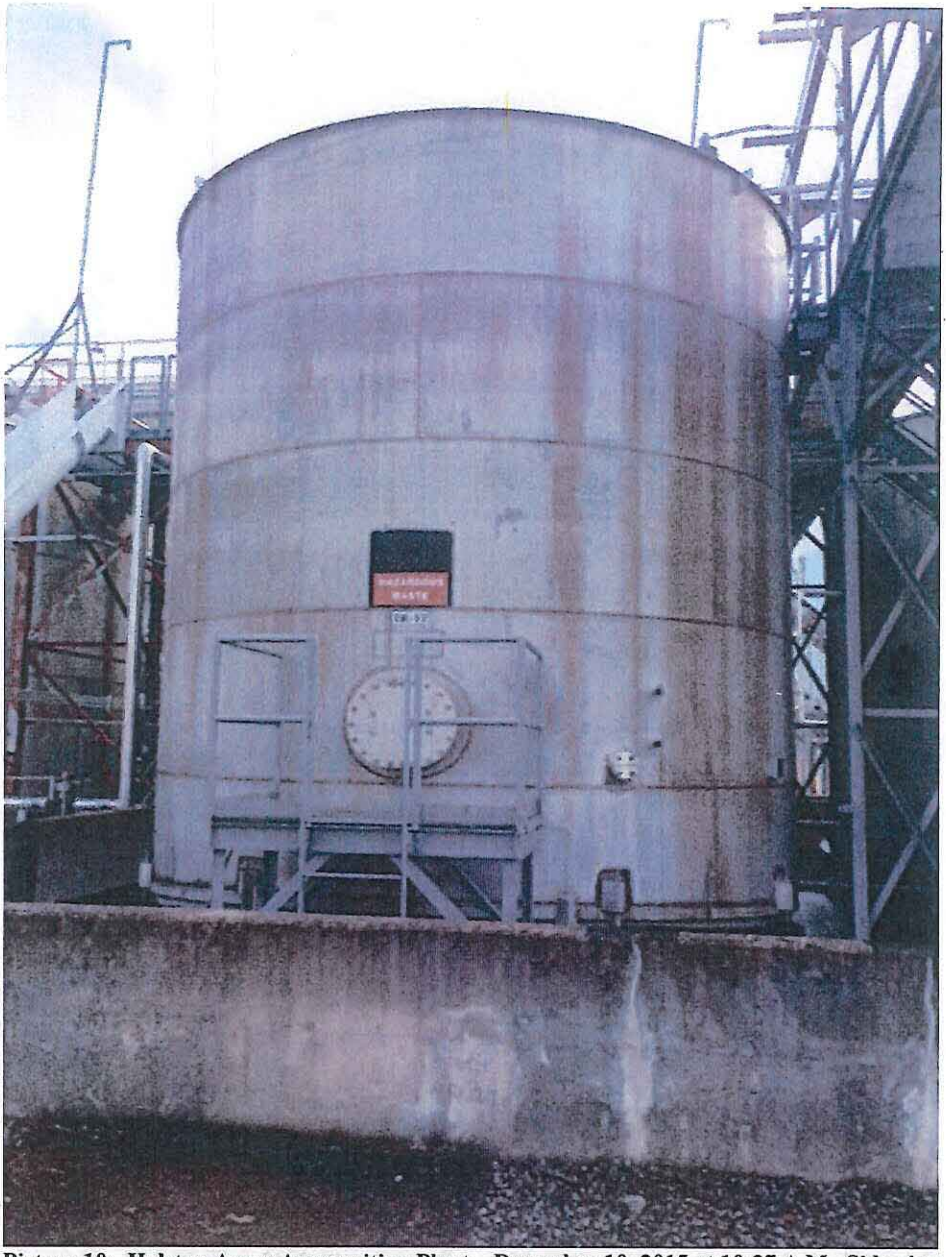
Picture 6: Holston Army Ammunition Plant – December 9, 2015 at 4:01 P.M. View of the debris accumulated in the storm water collection point near Pan 3 of the permitted Burning Ground. – Picture taken by Javier Garcia.



Picture 7: Holston Army Ammunition Plant – December 9, 2015 at 4:04 P.M. View of the permitted Burning Ground taken from the gate looking to the west. – Picture taken by Javier Garcia.

Picture 8: Holston Army Ammunition Plant – December 9, 2015 at 4:04 P.M. View of the permitted Burning Ground taken from the gate looking to the north. – Picture taken by Javier Garcia.

Picture 9: Holston Army Ammunition Plant – December 9, 2015 at 4:05 P.M. View of the permitted Burning Ground looking from the gate looking to the east. – Picture taken by Javier Garcia.



Picture 10: Holston Army Ammunition Plant – December 10, 2015 at 10:37 A.M. Side view of hazardous waste storage tank designated as Tank 17 showing required "Hazardous Waste" marking. Picture taken by Javier Garcia.

Picture 11: Holston Army Ammunition Plant – December 10, 2015 at 10:37 A.M. Close-up of the required "Hazardous Waste" marking on Tank 17 showing. Picture taken by Javier Garcia.

Picture 12: Holston Army Ammunition Plant – December 10, 2015 at 11:45 A.M. Release from the sand blasting unit outside the Paint Shop. Picture taken by Javier Garcia.

Appendix B Waste Determinations

Waste Stream Name
Solid Waste Stream #1 - Concrete and Masonry from Limited Area

Waste Stream Description
Concrete from the aprons and foundations and masonry material from explosive production buildings

Process/Building Generating Waste
Removal of concrete during construction or demolition

Description of Process Generating Waste
When production buildings are demolished or modernized, the existing concrete is sometimes removed or replaced.

Composition:
The composition of this waste stream is basically just concrete. Since this concrete is coming from an explosives production building, there is a high(er) likelihood that the concrete has been exposed to explosives.

Physical State
___✔___Solid
_____Liquid
_____Semi-solid
_____Dust/powder
_____Debris
_____Sludge
_____Gas/Aerosol

Odor
___✔___None
_____Mild
_____Strong
Describe _____

Flashpoint N/A
pH N/A
Btu Range N/A
Specific Gravity N/A
Layers? N/A
Color White, brown
Wastewater/non-Wastewater Non-Wastewater

Characteristic?
_____D001, Ignitable (Flash point < 140F)
_____D002, Corrosive (pH <2.0 or > 12.5)
_____D003, Reactive
Water Reactive
Shock Sensitive
Oxidizer

Pyrophoric
Explosive
Sulfides
Cyanides
Other

(re: reactivity---See additional documentation at end of document for generator knowledge for D003)

_____D004-D043, Toxic (fail TCLP for specific compounds; if yes are there any UHCs?)
D030 (2,4-dinitrotoluene has the potential to be present if TNT or Composition B which contains TNT.)
___✔____ No Hazardous Characteristic/Non Hazardous

Listed?
_____F (spent solvents)
_____K (generated by specific processes)
_____P (unused commercial chemicals, toxic)
_____U (unused commercial chemicals, acutely toxic)
___✔___ N/A. Not listed

Underlying Hazardous Constituents
(Anything painted will be tested for lead and PCBs if no generator knowledge exists to rule out PCBs or lead.) Also, any PCB suspect materials such as caulking, etc. will be tested to rule out PCBs or any other suspected UHC.

Source of information
Generator Knowledge

Disposal Method
Due to safety concerns and Army regulations, being classified similar to a Division 1.4 (or lesser—**not** a 1.1, 1.2, or 1.3) explosive material, it is still classified via Army regulations as Material Determined to have an Explosive Hazard (MDEH). This material, when not evaluated by Safety to be MDAS (material determined as safe), must be thermally decontaminated via permitted Title V covered activity of open burning since no other safe alternatives for disposal exist. HSAAP's current thermal decontamination method is open burning until a new technology is identified and implemented.

D003 Characterization and Documentation

Generator Knowledge Documentation

The foundation of our determination for **Waste Stream #1** is based on our answers (in red) for the 7 properties of reactivity defined at 40 CFR 261.23(a):

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties.

(1) It is normally unstable and readily undergoes violent change without detonating.
Solid Waste Stream 1 being sent to the cage or pile are stable and does not readily undergo violent change without detonating.

(2) It reacts violently with water.
Solid Waste Stream 1 does not react violently with water.

(3) It forms potentially explosive mixtures with water.
Solid Waste Stream 1 does not form potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 1 does not generate toxic gases, vapors, or fumes when mixed with water.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 1 is not cyanide or sulfide bearing wastes.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
Current screening procedures eliminate the allowance of grossly explosives contaminated materials from being added to the cages or piles. Solid Waste Stream 1 is similarly described as *Division 1.4 hazard class—substances and articles which present only a small hazard in the event of ignition or initiation. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package [article] (49 CFR 173.50 and 173.53).*

In this regard, Solid Waste Stream 1 is not capable of detonation or explosive reaction if it is being subjected to a strong initiating source or heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
Solid Waste Stream 1 is not readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.54, or is a Division 1.1, 1.2 or 1.3 explosive as defined in 49 CFR 173.50 and 173.53.
Solid Waste Stream 1 does not meet the class definition of Division 1.1, 1.2, or 1.3 explosives.

EPA Regulatory memos relevant to this characterization are also attached below.

9443.1988(10)

REACTIVE WASTE - EXPLOSIVITY

MEMORANDUM

DATE: September 8, 1988

SUBJECT: Definition of Reactive Waste - Explosivity

FROM: David Friedman, Chief
Methods Section, (OS-331)

TO: Sonya Stelmack,
Assistance Branch, (OS-343)

As you requested, I have reviewed the testing protocols and classification criteria used by the Department of Defense in evaluating the explosivity of material (Army TB 700-2, Navy NAVSEAINST 8020.8, Air Force To 11A-1-47, DLA DLAR 8220.1).

It is my judgement that the only materials that would exhibit the reactivity characteristic (40 CFR 261.23), due to their potential explosivity, are those that fall into Department of Defense Hazard Classes 1.1, 1.2, and 1.3. Materials rated as Class 1.4 would, therefore, not be an explosive within the meaning of the reactivity characteristic.

cc: Suzanne Rudzinski
Reva Rubenstein
Robert Dellinger

9443.1995(01)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

February 24, 1995

MEMORANDUM

SUBJECT: Debris and Soil Contaminated with Explosive Residues

FROM: James F. Michael, Chief
Disposal Technology Section (5303W)
Office of Solid Waste

TO: Lawrence A. Wapensky, Chief
Utah/North Dakota Section
Region VIII

This responds to your January 20, 1995 memorandum requesting assistance in answering questions raised by the State of Utah concerning regulatory issues pertaining to wastes contaminated with explosive residues.

The first question raises concern with the reference at 40 CFR 261.23(a)(8) to certain Department of Transportation (DOT) regulations concerning explosive classifications, that are cited as criteria for determining the characteristic of reactivity. The DOT regulations cited at 261.23(a)(8) have recently been changed and expanded to conform with Department of Defense hazard classes, therefore, presenting difficulties in implementing the Federal regulatory definition of reactivity under RCRA. Until such time that 261.23(a)(8) is updated, those referenced DOT regulations can not be used for determining reactivity. Reactivity determinations should be made using the remaining criteria at 261.23(a)(1) - (7).

The second question asks whether and when liquid, solid, or debris mixed with explosives would be considered reactive. Wastes, whether themselves explosives, or media contaminated with explosives could be considered reactive by meeting the definition of reactivity as described in 261.23(a)(1)-(7). Wastes that do not meet the criteria in 261.23(a)(1)-(7) would not be considered reactive.

The third question regards other Federal criteria for explosivity. If agencies such as the Bureau of Alcohol, Tobacco, and Firearms (BATF) have regulations, or protocols, for determining whether or not a substance is explosive, those regulations or protocols would not be enforceable under EPA regulations, unless they became incorporated into our rules. Specific methods used by agencies such as BATF to determine if a substance is an explosive could however, be applied to determine whether a waste is reactive according to 261.23(a)(6) or (7).

Thank you for the opportunity to address questions related to the reactivity characteristic as it relates to explosives. If you have any questions, please call Jeff Gaines at (703) 308-8655.

cc: Frank McAlister, AB, PSPD, OSW
Jeff Gaines, AB, PSPD, OSW

Waste Stream Name
Solid Waste Stream #2 - Fiber drums and Cardboard from the limited area

Waste Stream Description
Empty fiber drums that were used to store raw materials including explosives and cardboard used in explosives buildings

Process/Building Generating Waste
Explosives manufacturing

Description of Process Generating Waste
Explosives production receives many types of raw materials, including explosives, in fiber drums and cardboard boxes. If the fiber drums or boxes cannot be reused, the plant will dispose of it.

Composition:
The fiber drums are primarily made up of cardboard with metal rings at the top and bottom. Cardboard boxes are just made from cardboard. Since the fiber drums and cardboard were used in explosives production and might have contained explosives, the fiber drums and cardboard have the potential to contain residual explosives.

Physical State
- ✔ Solid
- _____ Liquid
- _____ Semi-solid
- _____ Dust/powder
- _____ Debris
- _____ Sludge
- _____ Gas/Aerosol

Odor
- ✔ None
- _____ Mild
- _____ Strong

Describe _____

Flashpoint N/A
pH N/A
Btu Range N/A
Specific Gravity N/A
Layers? N/A
Color Brown, metal
Wastewater/non-Wastewater Non-Wastewater

Characteristic?
- _____ D001, Ignitable (Flash point < 140F)
- _____ D002, Corrosive (pH <2.0 or > 12.5)
- _____ D003, Reactive
  Water Reactive

Shock Sensitive
Oxidizer
Pyrophoric
Explosive
Sulfides
Cyanides
Other

(re: reactivity---See additional documentation at end of document for generator knowledge for D003)

_____D004-D043, Toxic (fail TCLP for specific compounds; if yes are there any UHCs?)
D030 (2,4-dinitrotoluene has the potential to be present if TNT or Composition B which contains TNT.)
___✔____ No Hazardous Characteristic/Non Hazardous

Listed?
_____F (spent solvents)
_____K (generated by specific processes)
_____P (unused commercial chemicals, toxic)
_____U (unused commercial chemicals, acutely toxic)
___✔___ N/A. Not listed

Underlying Hazardous Constituents (Anything painted will be tested for lead and PCBs if no generator knowledge exists to rule out PCBs or lead.) **Note: This stream typically never involves painted items**.

Source of information
Generator Knowledge

Disposal Method
Due to safety concerns and Army regulations, being classified similar to a Division 1.4 (or lesser—**not** a 1.1, 1.2, or 1.3) explosive material, it is still classified via Army regulations as Material Determined to have an Explosive Hazard (MDEH). This material, when not evaluated by Safety to be MDAS (material determined as safe), must be thermally decontaminated via permitted Title V covered activity of open burning since no other safe alternatives for disposal exist. HSAAP's current thermal decontamination method is open burning until a new technology is identified and implemented.

D003 Characterization and Documentation

Generator Knowledge Documentation

The foundation of our determination for **Waste Stream #2** is based on our answers (in red) for the 7 properties of reactivity defined at 40 CFR 261.23(a):

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties.

(1) It is normally unstable and readily undergoes violent change without detonating.
Solid Waste Stream 2 being sent to the cage or pile are stable and does not readily undergo violent change without detonating.

(2) It reacts violently with water.
Solid Waste Stream 2 does not react violently with water.

(3) It forms potentially explosive mixtures with water.
Solid Waste Stream 2 does not form potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 2 does not generate toxic gases, vapors, or fumes when mixed with water.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 2 is not cyanide or sulfide bearing wastes.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
Current screening procedures eliminate the allowance of grossly explosives contaminated materials from being added to the cages or piles. Solid Waste Stream 2 is similarly described as *Division 1.4 hazard class—substances and articles which present only a small hazard in the event of ignition or initiation. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package [article] (49 CFR 173.50 and 173.53).*

In this regard, Solid Waste Stream 2 is not capable of detonation or explosive reaction if it is being subjected to a strong initiating source or heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
Solid Waste Stream 2 is not readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.54, or is a Division 1.1, 1.2 or 1.3 explosive as defined in 49 CFR 173.50 and 173.53.
Solid Waste Stream 2 does not meet the class definition of Division 1.1, 1.2, or 1.3 explosives.

EPA Regulatory memos relevant to this characterization are also attached below.

9443.1988(10)

REACTIVE WASTE - EXPLOSIVITY

MEMORANDUM

DATE: September 8, 1988

SUBJECT: Definition of Reactive Waste - Explosivity

FROM: David Friedman, Chief
Methods Section, (OS-331)

TO: Sonya Stelmack,
Assistance Branch, (OS-343)

As you requested, I have reviewed the testing protocols and classification criteria used by the Department of Defense in evaluating the explosivity of material (Army TB 700-2, Navy NAVSEAINST 8020.8, Air Force To 11A-1-47, DLA DLAR 8220.1).

It is my judgement that the only materials that would exhibit the reactivity characteristic (40 CFR 261.23), due to their potential explosivity, are those that fall into Department of Defense Hazard Classes 1.1, 1.2, and 1.3. Materials rated as Class 1.4 would, therefore, not be an explosive within the meaning of the reactivity characteristic.

cc: Suzanne Rudzinski
Reva Rubenstein
Robert Dellinger

9443.1995(01)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

February 24, 1995

MEMORANDUM

SUBJECT: Debris and Soil Contaminated with Explosive Residues

FROM: James F. Michael, Chief
Disposal Technology Section (5303W)
Office of Solid Waste

TO: Lawrence A. Wapensky, Chief
Utah/North Dakota Section
Region VIII

This responds to your January 20, 1995 memorandum requesting assistance in answering questions raised by the State of Utah concerning regulatory issues pertaining to wastes contaminated with explosive residues.

The first question raises concern with the reference at 40 CFR 261.23(a)(8) to certain Department of Transportation (DOT) regulations concerning explosive classifications, that are cited as criteria for determining the characteristic of reactivity. The DOT regulations cited at 261.23(a)(8) have recently been changed and expanded to conform with Department of Defense hazard classes, therefore, presenting difficulties in implementing the Federal regulatory definition of reactivity under RCRA. Until such time that 261.23(a)(8) is updated, those referenced DOT regulations can not be used for determining reactivity. Reactivity determinations should be made using the remaining criteria at 261.23(a)(1) - (7).

The second question asks whether and when liquid, solid, or debris mixed with explosives would be considered reactive. Wastes, whether themselves explosives, or media contaminated with explosives could be considered reactive by meeting the definition of reactivity as described in 261.23(a)(1)-(7). Wastes that do not meet the criteria in 261.23(a)(1)-(7) would not be considered reactive.

The third question regards other Federal criteria for explosivity. If agencies such as the Bureau of Alcohol, Tobacco, and Firearms (BATF) have regulations, or protocols, for determining whether or not a substance is explosive, those regulations or protocols would not be enforceable under EPA regulations, unless they became incorporated into our rules. Specific methods used by agencies such as BATF to determine if a substance is an explosive could however, be applied to determine whether a waste is reactive according to 261.23(a)(6) or (7).

Thank you for the opportunity to address questions related to the reactivity characteristic as it relates to explosives. If you have any questions, please call Jeff Gaines at (703) 308-8655.

cc: Frank McAlister, AB, PSPD, OSW
Jeff Gaines, AB, PSPD, OSW

Waste Stream Name
Solid Waste Stream #3 - Metal from the Limited Area

Waste Stream Description
Can include any metal used in an explosives production building. This includes process piping, conduit, motors, pumps, wire, vessels, etc.

Process/Building Generating Waste
Explosives manufacturing

Description of Process Generating Waste
When explosives production buildings are modernized or demolished, metal waste is produced. Metal waste is also produced when new piping, wiring, parts or etc. is replaced or repaired in an explosives building.

Composition:
Steel, iron, brass, copper, etc. Since the metal was in service in an explosives production building, there is a high likelihood that the metal has been exposed to explosives.

Physical State
- ✔ Solid
- _____ Liquid
- _____ Semi-solid
- _____ Dust/powder
- _____ Debris
- _____ Sludge
- _____ Gas/Aerosol

Odor
- ✔ None
- _____ Mild
- _____ Strong

Describe _____

Flashpoint N/A
pH N/A
Btu Range N/A
Specific Gravity N/A
Layers? N/A
Color Various metals
Wastewater/non-Wastewater Non-Wastewater

Characteristic?
- _____ D001, Ignitable (Flash point < 140F)
- _____ D002, Corrosive (pH <2.0 or > 12.5)
- _____ D003, Reactive
  Water Reactive

Shock Sensitive
Oxidizer
Pyrophoric
Explosive
Sulfides
Cyanides
Other

(re: reactivity---See additional documentation at end of document for generator knowledge for D003)

_____D004-D043, Toxic (fail TCLP for specific compounds; if yes are there any UHCs?)
D030 (2,4-dinitrotoluene has the potential to be present if TNT or Composition B which contains TNT.)
___✔____ No Hazardous Characteristic/Non Hazardous

Listed?
_____F (spent solvents)
_____K (generated by specific processes)
_____P (unused commercial chemicals, toxic)
_____U (unused commercial chemicals, acutely toxic)
___✔___ N/A. Not listed

Underlying Hazardous Constituents
(Anything painted will be tested for lead and PCBs if no generator knowledge exists to rule out PCBs or lead.) Also, any PCB suspect materials such as certain types of motors or caulking, etc. will be tested to rule out PCBs or any other suspected UHC.

Source of information
Generator Knowledge

Disposal Method
Due to safety concerns and Army regulations, being classified similar to a Division 1.4 (or lesser—**not** a 1.1, 1.2, or 1.3) explosive material, it is still classified via Army regulations as Material Determined to have an Explosive Hazard (MDEH). This material, when not evaluated by Safety to be MDAS (material determined as safe), must be thermally decontaminated via permitted Title V covered activity of open burning since no other safe alternatives for disposal exist. HSAAP's current thermal decontamination method is open burning until a new technology is identified and implemented.

D003 Characterization and Documentation

Generator Knowledge Documentation

The foundation of our determination for **Waste Stream #3** is based on our answers (in red) for the 7 properties of reactivity defined at 40 CFR 261.23(a):

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties.

(1) It is normally unstable and readily undergoes violent change without detonating.
Solid Waste Stream 3 being sent to the cage or pile are stable and does not readily undergo violent change without detonating.

(2) It reacts violently with water.
Solid Waste Stream 3 does not react violently with water.

(3) It forms potentially explosive mixtures with water.
Solid Waste Stream 3 does not form potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 3 does not generate toxic gases, vapors, or fumes when mixed with water.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 3 is not cyanide or sulfide bearing wastes.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
Current screening procedures eliminate the allowance of grossly explosives contaminated materials from being added to the cages or piles. Solid Waste Stream 3 is similarly described as *Division 1.4 hazard class—substances and articles which present only a small hazard in the event of ignition or initiation. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package [article] (49 CFR 173.50 and 173.53).*

In this regard, Solid Waste Stream 3 is not capable of detonation or explosive reaction if it is being subjected to a strong initiating source or heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
Solid Waste Stream 3 is not readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.54, or is a Division 1.1, 1.2 or 1.3 explosive as defined in 49 CFR 173.50 and 173.53.
Solid Waste Stream 3 does not meet the class definition of Division 1.1, 1.2, or 1.3 explosives.

EPA Regulatory memos relevant to this characterization are also attached below.

9443.1988(10)

REACTIVE WASTE - EXPLOSIVITY

MEMORANDUM

DATE: September 8, 1988

SUBJECT: Definition of Reactive Waste - Explosivity

FROM: David Friedman, Chief
Methods Section, (OS-331)

TO: Sonya Stelmack,
Assistance Branch, (OS-343)

As you requested, I have reviewed the testing protocols and classification criteria used by the Department of Defense in evaluating the explosivity of material (Army TB 700-2, Navy NAVSEAINST 8020.8, Air Force To 11A-1-47, DLA DLAR 8220.1).

It is my judgement that the only materials that would exhibit the reactivity characteristic (40 CFR 261.23), due to their potential explosivity, are those that fall into Department of Defense Hazard Classes 1.1, 1.2, and 1.3. Materials rated as Class 1.4 would, therefore, not be an explosive within the meaning of the reactivity characteristic.

cc: Suzanne Rudzinski
Reva Rubenstein
Robert Dellinger

9443.1995(01)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

February 24, 1995

MEMORANDUM

SUBJECT: Debris and Soil Contaminated with Explosive Residues

FROM: James F. Michael, Chief
Disposal Technology Section (5303W)
Office of Solid Waste

TO: Lawrence A. Wapensky, Chief
Utah/North Dakota Section
Region VIII

This responds to your January 20, 1995 memorandum requesting assistance in answering questions raised by the State of Utah concerning regulatory issues pertaining to wastes contaminated with explosive residues.

The first question raises concern with the reference at 40 CFR 261.23(a)(8) to certain Department of Transportation (DOT) regulations concerning explosive classifications, that are cited as criteria for determining the characteristic of reactivity. The DOT regulations cited at 261.23(a)(8) have recently been changed and expanded to conform with Department of Defense hazard classes, therefore, presenting difficulties in implementing the Federal regulatory definition of reactivity under RCRA. Until such time that 261.23(a)(8) is updated, those referenced DOT regulations can not be used for determining reactivity. Reactivity determinations should be made using the remaining criteria at 261.23(a)(1) - (7).

The second question asks whether and when liquid, solid, or debris mixed with explosives would be considered reactive. Wastes, whether themselves explosives, or media contaminated with explosives could be considered reactive by meeting the definition of reactivity as described in 261.23(a)(1)-(7). Wastes that do not meet the criteria in 261.23(a)(1)-(7) would not be considered reactive.

The third question regards other Federal criteria for explosivity. If agencies such as the Bureau of Alcohol, Tobacco, and Firearms (BATF) have regulations, or protocols, for determining whether or not a substance is explosive, those regulations or protocols would not be enforceable under EPA regulations, unless they became incorporated into our rules. Specific methods used by agencies such as BATF to determine if a substance is an explosive could however, be applied to determine whether a waste is reactive according to 261.23(a)(6) or (7).

Thank you for the opportunity to address questions related to the reactivity characteristic as it relates to explosives. If you have any questions, please call Jeff Gaines at (703) 308-8655.

cc: Frank McAlister, AB, PSPD, OSW
Jeff Gaines, AB, PSPD, OSW

Waste Stream Name
Solid Waste Stream #4 - Personal Protective Equipment (PPE) from Limited Area

Waste Stream Description
Respirators, gloves, Tyvek suits, hats, safety glasses, boots, coveralls

Process/Building Generating Waste
Explosives manufacturing

Description of Process Generating Waste
Employees that work in explosives production buildings are required to wear PPE. As this PPE gets worn out, or is required to be changed out due to manufacturer's recommendations it is disposed of onsite.

Composition:
Plastic, metal, Tyvek, leather, rubber, cotton. Due to direct contact with explosives material, there is a high likelihood that the PPE used in the explosives production buildings has been exposed to explosives.

Physical State
- [x] Solid
- [ ] Liquid
- [ ] Semi-solid
- [ ] Dust/powder
- [ ] Debris
- [ ] Sludge
- [ ] Gas/Aerosol

Odor
- [x] None
- [ ] Mild
- [ ] Strong

Describe _____

Flashpoint	N/A
pH	N/A
Btu Range	N/A
Specific Gravity	N/A
Layers?	N/A
Color	Various

Wastewater/non-Wastewater Non-Wastewater

Characteristic?
- [ ] D001, Ignitable (Flash point < 140F)
- [ ] D002, Corrosive (pH <2.0 or > 12.5)
- [ ] D003, Reactive
  - Water Reactive
  - Shock Sensitive
  - Oxidizer
  - Pyrophoric

Explosive
Sulfides
Cyanides
Other

(re: reactivity---See additional documentation at end of document for generator knowledge for D003)

_____D004-D043, Toxic (fail TCLP for specific compounds; if yes are there any UHCs?)
D030 (2,4-dinitrotoluene has the potential to be present if TNT or Composition B which contains TNT.)
___✔____ No Hazardous Characteristic/Non Hazardous

Listed?
_____F (spent solvents)
_____K (generated by specific processes)
_____P (unused commercial chemicals, toxic)
_____U (unused commercial chemicals, acutely toxic)
___✔___ N/A. Not listed

Underlying Hazardous Constituents
(Anything painted will be tested for lead and PCBs if no generator knowledge exists to rule out PCBs or lead.) **However, painted and/or lead/PCB containing materials is typically never a suspect UHC for this stream.** If any other UHC is suspected, it will be tested to rule out suspect UHC.

Source of information
Generator Knowledge

Disposal Method
Due to safety concerns and Army regulations, being classified similar to a Division 1.4 (or lesser—**not** a 1.1, 1.2, or 1.3) explosive material, it is still classified via Army regulations as Material Determined to have an Explosive Hazard (MDEH). This material, when not evaluated by Safety to be MDAS (material determined as safe), must be thermally decontaminated via permitted Title V covered activity of open burning since no other safe alternatives for disposal exist. HSAAP's current thermal decontamination method is open burning until a new technology is identified and implemented.

D003 Characterization and Documentation

Generator Knowledge Documentation

The foundation of our determination for **Waste Stream #4** is based on our answers (in red) for the 7 properties of reactivity defined at 40 CFR 261.23(a):

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties.

(1) It is normally unstable and readily undergoes violent change without detonating.
Solid Waste Stream 4 being sent to the cage or pile are stable and does not readily undergo violent change without detonating.

(2) It reacts violently with water.
Solid Waste Stream 4 does not react violently with water.

(3) It forms potentially explosive mixtures with water.
Solid Waste Stream 4 does not form potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 4 does not generate toxic gases, vapors, or fumes when mixed with water.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 4 is not cyanide or sulfide bearing wastes.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
Current screening procedures eliminate the allowance of grossly explosives contaminated materials from being added to the cages or piles. Solid Waste Stream 4 is similarly described as *Division 1.4 hazard class—substances and articles which present only a small hazard in the event of ignition or initiation. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package [article] (49 CFR 173.50 and 173.53).*

In this regard, Solid Waste Stream 4 is not capable of detonation or explosive reaction if it is being subjected to a strong initiating source or heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
Solid Waste Stream 4 is not readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.54, or is a Division 1.1, 1.2 or 1.3 explosive as defined in 49 CFR 173.50 and 173.53.
Solid Waste Stream 4 does not meet the class definition of Division 1.1, 1.2, or 1.3 explosives.

EPA Regulatory memos relevant to this characterization are also attached below.

9443.1988(10)

REACTIVE WASTE - EXPLOSIVITY

MEMORANDUM

DATE: September 8, 1988

SUBJECT: Definition of Reactive Waste - Explosivity

FROM: David Friedman, Chief
Methods Section, (OS-331)

TO: Sonya Stelmack,
Assistance Branch, (OS-343)

As you requested, I have reviewed the testing protocols and classification criteria used by the Department of Defense in evaluating the explosivity of material (Army TB 700-2, Navy NAVSEAINST 8020.8, Air Force To 11A-1-47, DLA DLAR 8220.1).

It is my judgement that the only materials that would exhibit the reactivity characteristic (40 CFR 261.23), due to their potential explosivity, are those that fall into Department of Defense Hazard Classes 1.1, 1.2, and 1.3. Materials rated as Class 1.4 would, therefore, not be an explosive within the meaning of the reactivity characteristic.

cc: Suzanne Rudzinski
Reva Rubenstein
Robert Dellinger

9443.1995(01)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

February 24, 1995

MEMORANDUM

SUBJECT: Debris and Soil Contaminated with Explosive Residues

FROM: James F. Michael, Chief
Disposal Technology Section (5303W)
Office of Solid Waste

TO: Lawrence A. Wapensky, Chief
Utah/North Dakota Section
Region VIII

This responds to your January 20, 1995 memorandum requesting assistance in answering questions raised by the State of Utah concerning regulatory issues pertaining to wastes contaminated with explosive residues.

The first question raises concern with the reference at 40 CFR 261.23(a)(8) to certain Department of Transportation (DOT) regulations concerning explosive classifications, that are cited as criteria for determining the characteristic of reactivity. The DOT regulations cited at 261.23(a)(8) have recently been changed and expanded to conform with Department of Defense hazard classes, therefore, presenting difficulties in implementing the Federal regulatory definition of reactivity under RCRA. Until such time that 261.23(a)(8) is updated, those referenced DOT regulations can not be used for determining reactivity. Reactivity determinations should be made using the remaining criteria at 261.23(a)(1) - (7).

The second question asks whether and when liquid, solid, or debris mixed with explosives would be considered reactive. Wastes, whether themselves explosives, or media contaminated with explosives could be considered reactive by meeting the definition of reactivity as described in 261.23(a)(1)-(7). Wastes that do not meet the criteria in 261.23(a)(1)-(7) would not be considered reactive.

The third question regards other Federal criteria for explosivity. If agencies such as the Bureau of Alcohol, Tobacco, and Firearms (BATF) have regulations, or protocols, for determining whether or not a substance is explosive, those regulations or protocols would not be enforceable under EPA regulations, unless they became incorporated into our rules. Specific methods used by agencies such as BATF to determine if a substance is an explosive could however, be applied to determine whether a waste is reactive according to 261.23(a)(6) or (7).

Thank you for the opportunity to address questions related to the reactivity characteristic as it relates to explosives. If you have any questions, please call Jeff Gaines at (703) 308-8655.

cc: Frank McAlister, AB, PSPD, OSW
Jeff Gaines, AB, PSPD, OSW

Waste Stream Name
Solid Waste Stream #5 - Wood

Waste Stream Description
Pallets, building material, non-chemical treated wood

Process/Building Generating Waste
Materials handling, demolition, explosives production

Description of Process Generating Waste
Wood is generated when product and raw materials are delivered into explosives buildings on pallets and come into contact with explosives. Wooden buildings materials are generated when production buildings are demolished or modernized; the existing wood in these buildings is sometimes removed or replaced. Due to direct contact with explosives material, there is a high likelihood that wood used in the explosives production buildings has been exposed to explosives. In order to maintain the temperature required to meet the Army regulation for thermal decontamination, clean wood is sometimes added to the open burn pile.

Composition:
Wood

Physical State
- [x] Solid
- [ ] Liquid
- [ ] Semi-solid
- [ ] Dust/powder
- [ ] Debris
- [ ] Sludge
- [ ] Gas/Aerosol

Odor
- [x] None
- [ ] Mild
- [ ] Strong

Describe _____

Flashpoint N/A
pH N/A
Btu Range N/A
Specific Gravity N/A
Layers? N/A
Color Various
Wastewater/non-Wastewater Non-Wastewater

Characteristic?
- [ ] D001, Ignitable (Flash point < 140F)
- [ ] D002, Corrosive (pH <2.0 or > 12.5)
- [ ] D003, Reactive

Water Reactive
Shock Sensitive
Oxidizer
Pyrophoric
Explosive
Sulfides
Cyanides
Other

(re: reactivity---See additional documentation at end of document for generator knowledge for D003)

_____D004-D043, Toxic (fail TCLP for specific compounds; if yes are there any UHCs?)
D030 (2,4-dinitrotoluene has the potential to be present if TNT or Composition B which contains TNT.)
___✔____ No Hazardous Characteristic/Non Hazardous

Listed?
_____F (spent solvents)
_____K (generated by specific processes)
_____P (unused commercial chemicals, toxic)
_____U (unused commercial chemicals, acutely toxic)
___✔___ N/A. Not listed

Underlying Hazardous Constituents (Anything painted will be tested for lead and PCBs if no generator knowledge exists to rule out PCBs or lead.) Any other suspect lead/PCB/or other UHC containing materials will be tested to rule out any suspect UHC.

Source of information
Generator Knowledge

Disposal Method
Due to safety concerns and Army regulations, being classified similar to a Division 1.4 (or lesser—**not** a 1.1, 1.2, or 1.3) explosive material, it is still classified via Army regulations as Material Determined to have an Explosive Hazard (MDEH). This material, when not evaluated by Safety to be MDAS (material determined as safe), must be thermally decontaminated via permitted Title V covered activity of open burning since no other safe alternatives for disposal exist. HSAAP's current thermal decontamination method is open burning until a new technology is identified and implemented.

D003 Characterization and Documentation

Generator Knowledge Documentation

The foundation of our determination for **Waste Stream #5** is based on our answers (in red) for the 7 properties of reactivity defined at 40 CFR 261.23(a):

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties.

(1) It is normally unstable and readily undergoes violent change without detonating.
Solid Waste Stream 5 being sent to the cage or pile are stable and does not readily undergo violent change without detonating.

(2) It reacts violently with water.
Solid Waste Stream 5 does not react violently with water.

(3) It forms potentially explosive mixtures with water.
Solid Waste Stream 5 does not form potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 5 does not generate toxic gases, vapors, or fumes when mixed with water.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 5 is not cyanide or sulfide bearing wastes.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
Current screening procedures eliminate the allowance of grossly explosives contaminated materials from being added to the cages or piles. Solid Waste Stream 4 is similarly described as *Division 1.4 hazard class—substances and articles which present only a small hazard in the event of ignition or initiation. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package [article] (49 CFR 173.50 and 173.53).*

In this regard, Solid Waste Stream 5 is not capable of detonation or explosive reaction if it is being subjected to a strong initiating source or heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
Solid Waste Stream 5 is not readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.54, or is a Division 1.1, 1.2 or 1.3 explosive as defined in 49 CFR 173.50 and 173.53.
Solid Waste Stream 5 does not meet the class definition of Division 1.1, 1.2, or 1.3 explosives.

EPA Regulatory memos relevant to this characterization are also attached below.

9443.1988(10)

REACTIVE WASTE - EXPLOSIVITY

MEMORANDUM

DATE: September 8, 1988

SUBJECT: Definition of Reactive Waste - Explosivity

FROM: David Friedman, Chief
Methods Section, (OS-331)

TO: Sonya Stelmack,
Assistance Branch, (OS-343)

As you requested, I have reviewed the testing protocols and classification criteria used by the Department of Defense in evaluating the explosivity of material (Army TB 700-2, Navy NAVSEAINST 8020.8, Air Force To 11A-1-47, DLA DLAR 8220.1).

It is my judgement that the only materials that would exhibit the reactivity characteristic (40 CFR 261.23), due to their potential explosivity, are those that fall into Department of Defense Hazard Classes 1.1, 1.2, and 1.3. Materials rated as Class 1.4 would, therefore, not be an explosive within the meaning of the reactivity characteristic.

cc: Suzanne Rudzinski
Reva Rubenstein
Robert Dellinger

9443.1995(01)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

February 24, 1995

MEMORANDUM

SUBJECT: Debris and Soil Contaminated with Explosive Residues

FROM: James F. Michael, Chief
Disposal Technology Section (5303W)
Office of Solid Waste

TO: Lawrence A. Wapensky, Chief
Utah/North Dakota Section
Region VIII

This responds to your January 20, 1995 memorandum requesting assistance in answering questions raised by the State of Utah concerning regulatory issues pertaining to wastes contaminated with explosive residues.

The first question raises concern with the reference at 40 CFR 261.23(a)(8) to certain Department of Transportation (DOT) regulations concerning explosive classifications, that are cited as criteria for determining the characteristic of reactivity. The DOT regulations cited at 261.23(a)(8) have recently been changed and expanded to conform with Department of Defense hazard classes, therefore, presenting difficulties in implementing the Federal regulatory definition of reactivity under RCRA. Until such time that 261.23(a)(8) is updated, those referenced DOT regulations can not be used for determining reactivity. Reactivity determinations should be made using the remaining criteria at 261.23(a)(1) - (7).

The second question asks whether and when liquid, solid, or debris mixed with explosives would be considered reactive. Wastes, whether themselves explosives, or media contaminated with explosives could be considered reactive by meeting the definition of reactivity as described in 261.23(a)(1)-(7). Wastes that do not meet the criteria in 261.23(a)(1)-(7) would not be considered reactive.

The third question regards other Federal criteria for explosivity. If agencies such as the Bureau of Alcohol, Tobacco, and Firearms (BATF) have regulations, or protocols, for determining whether or not a substance is explosive, those regulations or protocols would not be enforceable under EPA regulations, unless they became incorporated into our rules. Specific methods used by agencies such as BATF to determine if a substance is an explosive could however, be applied to determine whether a waste is reactive according to 261.23(a)(6) or (7).

Thank you for the opportunity to address questions related to the reactivity characteristic as it relates to explosives. If you have any questions, please call Jeff Gaines at (703) 308-8655.

cc: Frank McAlister, AB, PSPD, OSW
Jeff Gaines, AB, PSPD, OSW

Waste Stream Name
Solid Waste Stream #6 - Soil

Waste Stream Description
Soil from the limited area

Process/Building Generating Waste
Accidental (explosives) discharges, demolition activities, excavation activities and etc.

Description of Process Generating Waste
Soil that must be removed and is contaminated with explosives, from historic activities or accidental discharges must be disposed

Composition:
Soil, rock, plant matter

Physical State
- [x] Solid
- [ ] Liquid
- [ ] Semi-solid
- [ ] Dust/powder
- [ ] Debris
- [ ] Sludge
- [ ] Gas/Aerosol

Odor
- [x] None
- [ ] Mild
- [ ] Strong

Describe _____

Flashpoint N/A
pH N/A
Btu Range N/A
Specific Gravity N/A
Layers? N/A
Color Various
Wastewater/non-Wastewater Non-Wastewater

Characteristic?
- [ ] D001, Ignitable (Flash point < 140F)
- [ ] D002, Corrosive (pH <2.0 or > 12.5)
- [ ] D003, Reactive
  - Water Reactive
  - Shock Sensitive
  - Oxidizer
  - Pyrophoric
  - Explosive

Sulfides
Cyanides
Other

(re: reactivity---See additional documentation at end of document for generator knowledge for D003)

_____D004-D043, Toxic (fail TCLP for specific compounds; if yes are there any UHCs?)
D030 (2,4-dinitrotoluene has the potential to be present if TNT or Composition B which contains TNT.)
___✔____ No Hazardous Characteristic/Non Hazardous

Listed?
_____F (spent solvents)
_____K (generated by specific processes)
_____P (unused commercial chemicals, toxic)
_____U (unused commercial chemicals, acutely toxic)
___✔___ N/A. Not listed

Underlying Hazardous Constituents
Any soil suspect for any UHCs will be tested to rule out any suspect for any other hazardous constituents.

Source of information
Generator Knowledge

Disposal Method
Due to safety concerns and Army regulations, being classified similar to a Division 1.4 (or lesser—**not** a 1.1, 1.2, or 1.3) explosive material, it is still classified via Army regulations as Material Determined to have an Explosive Hazard (MDEH). This material, when not evaluated by Safety to be MDAS (material determined as safe), must be thermally decontaminated via permitted Title V covered activity of open burning since no other safe alternatives for disposal exist. HSAAP's current thermal decontamination method is open burning until a new technology is identified and implemented.

D003 Characterization and Documentation

Generator Knowledge Documentation

The foundation of our determination for **Waste Stream #6** is based on our answers (in red) for the 7 properties of reactivity defined at 40 CFR 261.23(a):

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties.

(1) It is normally unstable and readily undergoes violent change without detonating.
Solid Waste Stream 6 being sent to the cage or pile are stable and does not readily undergo violent change without detonating.

(2) It reacts violently with water.
Solid Waste Stream 6 does not react violently with water.

(3) It forms potentially explosive mixtures with water.
Solid Waste Stream 6 does not form potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 6 does not generate toxic gases, vapors, or fumes when mixed with water.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 6 is not cyanide or sulfide bearing wastes.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
Current screening procedures eliminate the allowance of grossly explosives contaminated materials from being added to the cages or piles. Solid Waste Stream 6 is similarly described as *Division 1.4 hazard class—substances and articles which present only a small hazard in the event of ignition or initiation. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package [article] (49 CFR 173.50 and 173.53).*

In this regard, Solid Waste Stream 6 is not capable of detonation or explosive reaction if it is being subjected to a strong initiating source or heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
Solid Waste Stream 6 is not readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.54, or is a Division 1.1, 1.2 or 1.3 explosive as defined in 49 CFR 173.50 and 173.53.
Solid Waste Stream 6 does not meet the class definition of Division 1.1, 1.2, or 1.3 explosives.

EPA Regulatory memos relevant to this characterization are also attached below.

9443.1988(10)

REACTIVE WASTE - EXPLOSIVITY

MEMORANDUM

DATE: September 8, 1988

SUBJECT: Definition of Reactive Waste - Explosivity

FROM: David Friedman, Chief
Methods Section, (OS-331)

TO: Sonya Stelmack,
Assistance Branch, (OS-343)

As you requested, I have reviewed the testing protocols and classification criteria used by the Department of Defense in evaluating the explosivity of material (Army TB 700-2, Navy NAVSEAINST 8020.8, Air Force To 11A-1-47, DLA DLAR 8220.1).

It is my judgement that the only materials that would exhibit the reactivity characteristic (40 CFR 261.23), due to their potential explosivity, are those that fall into Department of Defense Hazard Classes 1.1, 1.2, and 1.3. Materials rated as Class 1.4 would, therefore, not be an explosive within the meaning of the reactivity characteristic.

cc: Suzanne Rudzinski
Reva Rubenstein
Robert Dellinger

9443.1995(01)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

February 24, 1995

MEMORANDUM

SUBJECT: Debris and Soil Contaminated with Explosive Residues

FROM: James F. Michael, Chief
Disposal Technology Section (5303W)
Office of Solid Waste

TO: Lawrence A. Wapensky, Chief
Utah/North Dakota Section
Region VIII

This responds to your January 20, 1995 memorandum requesting assistance in answering questions raised by the State of Utah concerning regulatory issues pertaining to wastes contaminated with explosive residues.

The first question raises concern with the reference at 40 CFR 261.23(a)(8) to certain Department of Transportation (DOT) regulations concerning explosive classifications, that are cited as criteria for determining the characteristic of reactivity. The DOT regulations cited at 261.23(a)(8) have recently been changed and expanded to conform with Department of Defense hazard classes, therefore, presenting difficulties in implementing the Federal regulatory definition of reactivity under RCRA. Until such time that 261.23(a)(8) is updated, those referenced DOT regulations can not be used for determining reactivity. Reactivity determinations should be made using the remaining criteria at 261.23(a)(1) - (7).

The second question asks whether and when liquid, solid, or debris mixed with explosives would be considered reactive. Wastes, whether themselves explosives, or media contaminated with explosives could be considered reactive by meeting the definition of reactivity as described in 261.23(a)(1)-(7). Wastes that do not meet the criteria in 261.23(a)(1)-(7) would not be considered reactive.

The third question regards other Federal criteria for explosivity. If agencies such as the Bureau of Alcohol, Tobacco, and Firearms (BATF) have regulations, or protocols, for determining whether or not a substance is explosive, those regulations or protocols would not be enforceable under EPA regulations, unless they became incorporated into our rules. Specific methods used by agencies such as BATF to determine if a substance is an explosive could however, be applied to determine whether a waste is reactive according to 261.23(a)(6) or (7).

Thank you for the opportunity to address questions related to the reactivity characteristic as it relates to explosives. If you have any questions, please call Jeff Gaines at (703) 308-8655.

cc: Frank McAlister, AB, PSPD, OSW
Jeff Gaines, AB, PSPD, OSW

Waste Stream Name
Plastic

Waste Stream Description
Drum liners, nutsche cover liners, etc.

Process/Building Generating Waste
Explosives manufacturing

Description of Process Generating Waste
Explosives production receives many types of raw materials, including explosives, in fiber drums and cardboard boxes that have plastic liners.

Composition:
The drum liners and nutsche liners are made from plastic materials. Since drum liners and nutsche liners were used in explosives production and might have directly contacted explosives, the plastic drum liners and nutsche liners have the potential to contain residual explosives.

Physical State
- ✔ Solid
- _____ Liquid
- _____ Semi-solid
- _____ Dust/powder
- _____ Debris
- _____ Sludge
- _____ Gas/Aerosol

Odor
- ✔ None
- _____ Mild
- _____ Strong

Describe _____

Flashpoint N/A
pH N/A
Btu Range N/A
Specific Gravity N/A
Layers? N/A
Color Clear, white
Wastewater/non-Wastewater Non-Wastewater

Characteristic?
- _____ D001, Ignitable (Flash point < 140F)
- _____ D002, Corrosive (pH <2.0 or > 12.5)
- _____ D003, Reactive
  - Water Reactive
  - Shock Sensitive
  - Oxidizer

Pyrophoric
Explosive
Sulfides
Cyanides
Other

(re: reactivity---See additional documentation at end of document for generator knowledge for D003)

_____D004-D043, Toxic (fail TCLP for specific compounds; if yes are there any UHCs?)
D030 (2,4-dinitrotoluene has the potential to be present if TNT or Composition B which contains TNT.)
___✔____ No Hazardous Characteristic/Non Hazardous

Listed?
_____F (spent solvents)
_____K (generated by specific processes)
_____P (unused commercial chemicals, toxic)
_____U (unused commercial chemicals, acutely toxic)
___✔___ N/A. Not listed

Underlying Hazardous Constituents
(Anything painted will be tested for lead and PCBs if no generator knowledge exists to rule out PCBs or lead.) Any other suspect lead/PCB/or other UHC containing materials will be tested to rule out any suspect UHC. This stream typically never has painted items or items suspect for any other UHC.

Source of information
Generator Knowledge

Disposal Method
Due to safety concerns and Army regulations, being classified similar to a Division 1.4 (or lesser—**not** a 1.1, 1.2, or 1.3) explosive material, it is still classified via Army regulations as Material Determined to have an Explosive Hazard (MDEH). This material, when not evaluated by Safety to be MDAS (material determined as safe), must be thermally decontaminated via permitted Title V covered activity of open burning since no other safe alternatives for disposal exist. HSAAP's current thermal decontamination method is open burning until a new technology is identified and implemented.

D003 Characterization and Documentation

Generator Knowledge Documentation

The foundation of our determination for **Waste Stream #7** is based on our answers (in red) for the 7 properties of reactivity defined at 40 CFR 261.23(a):

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties.

(1) It is normally unstable and readily undergoes violent change without detonating.
Solid Waste Stream 7 being sent to the cage or pile are stable and does not readily undergo violent change without detonating.

(2) It reacts violently with water.
Solid Waste Stream 7 does not react violently with water.

(3) It forms potentially explosive mixtures with water.
Solid Waste Stream 7 does not form potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 7 does not generate toxic gases, vapors, or fumes when mixed with water.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 7 is not cyanide or sulfide bearing wastes.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
Current screening procedures eliminate the allowance of grossly explosives contaminated materials from being added to the cages or piles. Solid Waste Stream 7 is similarly described as *Division 1.4 hazard class—substances and articles which present only a small hazard in the event of ignition or initiation. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package [article] (49 CFR 173.50 and 173.53).*

In this regard, Solid Waste Stream 7 is not capable of detonation or explosive reaction if it is being subjected to a strong initiating source or heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
Solid Waste Stream 7 is not readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.54, or is a Division 1.1, 1.2 or 1.3 explosive as defined in 49 CFR 173.50 and 173.53.
Solid Waste Stream 7 does not meet the class definition of Division 1.1, 1.2, or 1.3 explosives.

EPA Regulatory memos relevant to this characterization are also attached below.

9443.1988(10)

REACTIVE WASTE - EXPLOSIVITY

MEMORANDUM

DATE: September 8, 1988

SUBJECT: Definition of Reactive Waste - Explosivity

FROM: David Friedman, Chief
Methods Section, (OS-331)

TO: Sonya Stelmack,
Assistance Branch, (OS-343)

As you requested, I have reviewed the testing protocols and classification criteria used by the Department of Defense in evaluating the explosivity of material (Army TB 700-2, Navy NAVSEAINST 8020.8, Air Force To 11A-1-47, DLA DLAR 8220.1).

It is my judgement that the only materials that would exhibit the reactivity characteristic (40 CFR 261.23), due to their potential explosivity, are those that fall into Department of Defense Hazard Classes 1.1, 1.2, and 1.3. Materials rated as Class 1.4 would, therefore, not be an explosive within the meaning of the reactivity characteristic.

cc: Suzanne Rudzinski
Reva Rubenstein
Robert Dellinger

9443.1995(01)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

February 24, 1995

MEMORANDUM

SUBJECT: Debris and Soil Contaminated with Explosive Residues

FROM: James F. Michael, Chief
Disposal Technology Section (5303W)
Office of Solid Waste

TO: Lawrence A. Wapensky, Chief
Utah/North Dakota Section
Region VIII

This responds to your January 20, 1995 memorandum requesting assistance in answering questions raised by the State of Utah concerning regulatory issues pertaining to wastes contaminated with explosive residues.

The first question raises concern with the reference at 40 CFR 261.23(a)(8) to certain Department of Transportation (DOT) regulations concerning explosive classifications, that are cited as criteria for determining the characteristic of reactivity. The DOT regulations cited at 261.23(a)(8) have recently been changed and expanded to conform with Department of Defense hazard classes, therefore, presenting difficulties in implementing the Federal regulatory definition of reactivity under RCRA. Until such time that 261.23(a)(8) is updated, those referenced DOT regulations can not be used for determining reactivity. Reactivity determinations should be made using the remaining criteria at 261.23(a)(1) - (7).

The second question asks whether and when liquid, solid, or debris mixed with explosives would be considered reactive. Wastes, whether themselves explosives, or media contaminated with explosives could be considered reactive by meeting the definition of reactivity as described in 261.23(a)(1)-(7). Wastes that do not meet the criteria in 261.23(a)(1)-(7) would not be considered reactive.

The third question regards other Federal criteria for explosivity. If agencies such as the Bureau of Alcohol, Tobacco, and Firearms (BATF) have regulations, or protocols, for determining whether or not a substance is explosive, those regulations or protocols would not be enforceable under EPA regulations, unless they became incorporated into our rules. Specific methods used by agencies such as BATF to determine if a substance is an explosive could however, be applied to determine whether a waste is reactive according to 261.23(a)(6) or (7).

Thank you for the opportunity to address questions related to the reactivity characteristic as it relates to explosives. If you have any questions, please call Jeff Gaines at (703) 308-8655.

cc: Frank McAlister, AB, PSPD, OSW
Jeff Gaines, AB, PSPD, OSW

Waste Stream Name
Explosives Contaminated Oil

Waste Stream Description
Oil removed from machinery, pumps, motors, elevators used in explosives production buildings.

Process/Building Generating Waste
Explosives production

Description of Process Generating Waste
When maintenance removes the oil from equipment located in explosives production buildings, the oil is collected and disposed.

Composition:
The composition of this waste stream is various types of industrial oil. Since this oil is coming from an explosives production building, there is a high likelihood that the oil has been exposed to explosives. Prior to thermal decontamination, all oil is tested for TCLP Metals, TCLP organics, and PCBs.
Oil from transformers or other electrical equipment is not included in this waste stream so this waste stream is not contaminated with PCBs—however analytical testing for PCBs will always be conducted.

Physical State
_____Solid
__✔__Liquid
_____Semi-solid
_____Dust/powder
_____Debris
_____Sludge
_____Gas/Aerosol

Odor
_____None
__✔__Mild
_____Strong
Describe _____

Flashpoint >140F
pH Neutral
Btu Range 5000-10000
Specific Gravity 8
Layers? N/A
Color Brown, clear, yellow
Wastewater/non-Wastewater Non-Wastewater

Characteristic?
_____D001, Ignitable (Flash point < 140F)
_____D002, Corrosive (pH <2.0 or > 12.5)
_____D003, Reactive

Water Reactive
Shock Sensitive
Oxidizer
Pyrophoric
Explosive
Sulfides
Cyanides
Other

(re: reactivity---See additional documentation at end of document for generator knowledge for D003)

_____D004-D043, Toxic (fail TCLP for specific compounds; if yes are there any UHCs?)
D030 (2,4-dinitrotoluene has the potential to be present if TNT or Composition B which contains TNT.)
___✔____ No Hazardous Characteristic/Non Hazardous

Listed?
_____F (spent solvents)
_____K (generated by specific processes)
_____P (unused commercial chemicals, toxic)
_____U (unused commercial chemicals, acutely toxic)
___✔___ N/A. Not listed

Underlying Hazardous Constituents
Prior to thermal decontamination, all oil is tested for TCLP Metals, TCLP organics, and PCBs.

Source of information
Generator Knowledge **and analytical testing**

Disposal Method
Due to safety concerns and Army regulations, being classified similar to a Division 1.4 (or lesser—**not** a 1.1, 1.2, or 1.3) explosive material, it is still classified via Army regulations as Material Determined to have an Explosive Hazard (MDEH). This material, when not evaluated by Safety to be MDAS (material determined as safe), must be thermally decontaminated via permitted Title V covered activity of open burning since no other safe alternatives for disposal exist. HSAAP's current thermal decontamination method is open burning until a new technology is identified and implemented.

D003 Characterization and Documentation

Generator Knowledge Documentation

The foundation of our determination for **Waste Stream #8** is based on our answers (in red) for the 7 properties of reactivity defined at 40 CFR 261.23(a):

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties.

(1) It is normally unstable and readily undergoes violent change without detonating.
Solid Waste Stream 8 being sent to the cage or pile are stable and does not readily undergo violent change without detonating.

(2) It reacts violently with water.
Solid Waste Stream 8 does not react violently with water.

(3) It forms potentially explosive mixtures with water.
Solid Waste Stream 8 does not form potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 8 does not generate toxic gases, vapors, or fumes when mixed with water.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 8 is not cyanide or sulfide bearing wastes.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
Current screening procedures eliminate the allowance of grossly explosives contaminated materials from being added to the cages or piles. Solid Waste Stream 8 is similarly described as *Division 1.4 hazard class—substances and articles which present only a small hazard in the event of ignition or initiation. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package [article] (49 CFR 173.50 and 173.53).*

In this regard, Solid Waste Stream 8 is not capable of detonation or explosive reaction if it is being subjected to a strong initiating source or heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
Solid Waste Stream 8 is not readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.54, or is a Division 1.1, 1.2 or 1.3 explosive as defined in 49 CFR 173.50 and 173.53.
Solid Waste Stream 8 does not meet the class definition of Division 1.1, 1.2, or 1.3 explosives.

EPA Regulatory memos relevant to this characterization are also attached below.

9443.1988(10)

REACTIVE WASTE - EXPLOSIVITY

MEMORANDUM

DATE: September 8, 1988

SUBJECT: Definition of Reactive Waste - Explosivity

FROM: David Friedman, Chief
Methods Section, (OS-331)

TO: Sonya Stelmack,
Assistance Branch, (OS-343)

As you requested, I have reviewed the testing protocols and classification criteria used by the Department of Defense in evaluating the explosivity of material (Army TB 700-2, Navy NAVSEAINST 8020.8, Air Force To 11A-1-47, DLA DLAR 8220.1).

It is my judgement that the only materials that would exhibit the reactivity characteristic (40 CFR 261.23), due to their potential explosivity, are those that fall into Department of Defense Hazard Classes 1.1, 1.2, and 1.3. Materials rated as Class 1.4 would, therefore, not be an explosive within the meaning of the reactivity characteristic.

cc: Suzanne Rudzinski
Reva Rubenstein
Robert Dellinger

9443.1995(01)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

February 24, 1995

MEMORANDUM

SUBJECT: Debris and Soil Contaminated with Explosive Residues

FROM: James F. Michael, Chief
Disposal Technology Section (5303W)
Office of Solid Waste

TO: Lawrence A. Wapensky, Chief
Utah/North Dakota Section
Region VIII

This responds to your January 20, 1995 memorandum requesting assistance in answering questions raised by the State of Utah concerning regulatory issues pertaining to wastes contaminated with explosive residues.

The first question raises concern with the reference at 40 CFR 261.23(a)(8) to certain Department of Transportation (DOT) regulations concerning explosive classifications, that are cited as criteria for determining the characteristic of reactivity. The DOT regulations cited at 261.23(a)(8) have recently been changed and expanded to conform with Department of Defense hazard classes, therefore, presenting difficulties in implementing the Federal regulatory definition of reactivity under RCRA. Until such time that 261.23(a)(8) is updated, those referenced DOT regulations can not be used for determining reactivity. Reactivity determinations should be made using the remaining criteria at 261.23(a)(1) - (7).

The second question asks whether and when liquid, solid, or debris mixed with explosives would be considered reactive. Wastes, whether themselves explosives, or media contaminated with explosives could be considered reactive by meeting the definition of reactivity as described in 261.23(a)(1)-(7). Wastes that do not meet the criteria in 261.23(a)(1)-(7) would not be considered reactive.

The third question regards other Federal criteria for explosivity. If agencies such as the Bureau of Alcohol, Tobacco, and Firearms (BATF) have regulations, or protocols, for determining whether or not a substance is explosive, those regulations or protocols would not be enforceable under EPA regulations, unless they became incorporated into our rules. Specific methods used by agencies such as BATF to determine if a substance is an explosive could however, be applied to determine whether a waste is reactive according to 261.23(a)(6) or (7).

Thank you for the opportunity to address questions related to the reactivity characteristic as it relates to explosives. If you have any questions, please call Jeff Gaines at (703) 308-8655.

cc: Frank McAlister, AB, PSPD, OSW
Jeff Gaines, AB, PSPD, OSW

Waste Stream Name
General Explosives Manufacturing Waste

Waste Stream Description
Filters, probe socks, cloth nutsche covers and etc.

Process/Building Generating Waste
Explosives manufacturing

Description of Process Generating Waste
Explosives production uses various filters throughout the production process. Probe socks are used in water removal from explosives production. Nutsche covers are used to cover containers of product awaiting further processing

Composition:
Filters are composed of cotton, plastic, metal, and various filter media. Probe socks and nutsche covers are made of cotton. Since these materials were used in explosives production and have contained explosives, these materials contain residual explosives.

Physical State
- [x] Solid
- [ ] Liquid
- [ ] Semi-solid
- [ ] Dust/powder
- [ ] Debris
- [ ] Sludge
- [ ] Gas/Aerosol

Odor
- [x] None
- [ ] Mild
- [ ] Strong

Describe _____

Flashpoint N/A
pH N/A
Btu Range N/A
Specific Gravity N/A
Layers? N/A
Color Clear, white
Wastewater/non-Wastewater Non-Wastewater

Characteristic?
- [ ] D001, Ignitable (Flash point < 140F)
- [ ] D002, Corrosive (pH <2.0 or > 12.5)
- [ ] D003, Reactive
  - Water Reactive
  - Shock Sensitive

Oxidizer
Pyrophoric
Explosive
Sulfides
Cyanides
Other

(re: reactivity---See additional documentation at end of document for generator knowledge for D003)

_____D004-D043, Toxic (fail TCLP for specific compounds; if yes are there any UHCs?)
D030 (2,4-dinitrotoluene has the potential to be present if TNT or Composition B which contains TNT.)
___✔____ No Hazardous Characteristic/Non Hazardous

Listed?
_____F (spent solvents)
_____K (generated by specific processes)
_____P (unused commercial chemicals, toxic)
_____U (unused commercial chemicals, acutely toxic)
___✔___ N/A. Not listed

Underlying Hazardous Constituents
(Anything painted will be tested for lead and PCBs if no generator knowledge exists to rule out PCBs or lead.) Any other suspected UHC will be tested to rule out any hazardous constituent. This stream typically never includes painted or other suspect UHC items.

Source of information
Generator Knowledge

Disposal Method
Due to safety concerns and Army regulations, being classified similar to a Division 1.4 (or lesser—**not** a 1.1, 1.2, or 1.3) explosive material, it is still classified via Army regulations as Material Determined to have an Explosive Hazard (MDEH). This material, when not evaluated by Safety to be MDAS (material determined as safe), must be thermally decontaminated via permitted Title V covered activity of open burning since no other safe alternatives for disposal exist. HSAAP's current thermal decontamination method is open burning until a new technology is identified and implemented.

D003 Characterization and Documentation

Generator Knowledge Documentation

The foundation of our determination for **Waste Stream #9** is based on our answers (in red) for the 7 properties of reactivity defined at 40 CFR 261.23(a):

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties.

(1) It is normally unstable and readily undergoes violent change without detonating.
Solid Waste Stream 9 being sent to the cage or pile are stable and does not readily undergo violent change without detonating.

(2) It reacts violently with water.
Solid Waste Stream 9 does not react violently with water.

(3) It forms potentially explosive mixtures with water.
Solid Waste Stream 9 does not form potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 9 does not generate toxic gases, vapors, or fumes when mixed with water.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
Solid Waste Stream 9 is not cyanide or sulfide bearing wastes.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
Current screening procedures eliminate the allowance of grossly explosives contaminated materials from being added to the cages or piles. Solid Waste Stream 9 is similarly described as *Division 1.4 hazard class—substances and articles which present only a small hazard in the event of ignition or initiation. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package [article] (49 CFR 173.50 and 173.53).*

In this regard, Solid Waste Stream 9 is not capable of detonation or explosive reaction if it is being subjected to a strong initiating source or heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
Solid Waste Stream 9 is not readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.54, or is a Division 1.1, 1.2 or 1.3 explosive as defined in 49 CFR 173.50 and 173.53.
Solid Waste Stream 9 does not meet the class definition of Division 1.1, 1.2, or 1.3 explosives.

EPA Regulatory memos relevant to this characterization are also attached below.

9443.1988(10)

REACTIVE WASTE - EXPLOSIVITY

MEMORANDUM

DATE: September 8, 1988

SUBJECT: Definition of Reactive Waste - Explosivity

FROM: David Friedman, Chief
Methods Section, (OS-331)

TO: Sonya Stelmack,
Assistance Branch, (OS-343)

As you requested, I have reviewed the testing protocols and classification criteria used by the Department of Defense in evaluating the explosivity of material (Army TB 700-2, Navy NAVSEAINST 8020.8, Air Force To 11A-1-47, DLA DLAR 8220.1).

It is my judgement that the only materials that would exhibit the reactivity characteristic (40 CFR 261.23), due to their potential explosivity, are those that fall into Department of Defense Hazard Classes 1.1, 1.2, and 1.3. Materials rated as Class 1.4 would, therefore, not be an explosive within the meaning of the reactivity characteristic.

cc: Suzanne Rudzinski
Reva Rubenstein
Robert Dellinger

9443.1995(01)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

February 24, 1995

MEMORANDUM

SUBJECT: Debris and Soil Contaminated with Explosive Residues

FROM: James F. Michael, Chief
Disposal Technology Section (5303W)
Office of Solid Waste

TO: Lawrence A. Wapensky, Chief
Utah/North Dakota Section
Region VIII

This responds to your January 20, 1995 memorandum requesting assistance in answering questions raised by the State of Utah concerning regulatory issues pertaining to wastes contaminated with explosive residues.

The first question raises concern with the reference at 40 CFR 261.23(a)(8) to certain Department of Transportation (DOT) regulations concerning explosive classifications, that are cited as criteria for determining the characteristic of reactivity. The DOT regulations cited at 261.23(a)(8) have recently been changed and expanded to conform with Department of Defense hazard classes, therefore, presenting difficulties in implementing the Federal regulatory definition of reactivity under RCRA. Until such time that 261.23(a)(8) is updated, those referenced DOT regulations can not be used for determining reactivity. Reactivity determinations should be made using the remaining criteria at 261.23(a)(1) - (7).

The second question asks whether and when liquid, solid, or debris mixed with explosives would be considered reactive. Wastes, whether themselves explosives, or media contaminated with explosives could be considered reactive by meeting the definition of reactivity as described in 261.23(a)(1)-(7). Wastes that do not meet the criteria in 261.23(a)(1)-(7) would not be considered reactive.

The third question regards other Federal criteria for explosivity. If agencies such as the Bureau of Alcohol, Tobacco, and Firearms (BATF) have regulations, or protocols, for determining whether or not a substance is explosive, those regulations or protocols would not be enforceable under EPA regulations, unless they became incorporated into our rules. Specific methods used by agencies such as BATF to determine if a substance is an explosive could however, be applied to determine whether a waste is reactive according to 261.23(a)(6) or (7).

Thank you for the opportunity to address questions related to the reactivity characteristic as it relates to explosives. If you have any questions, please call Jeff Gaines at (703) 308-8655.

cc: Frank McAlister, AB, PSPD, OSW
Jeff Gaines, AB, PSPD, OSW

Appendix C - Special Waste Determination for Ash

Waste Stream Name Special Waste (in Active Landfill permit) – Burning Ground Ash

Waste Stream Description
Burning Ground Ash consists of ash left over from burning ground

Process/Building Generating Waste
Burning Ground thermal treatment of Solid Waste Streams #1-9

Description of Process Generating Waste
Solid Waste Streams #1-9 are thermally decontaminated per DODI 4140.62 requirements to ensure MDAS classification. Ash is generated because of this thermal decontamination.

Composition:
The residue may contain ash, carbon, grit, dirt, gravel, clay, etc. The analytical for this special waste approval (via Class II landfill permit) was updated in 2019. The analytical tested for RCRA metals, cyanide, sulfide, and initial Ph.

Physical State
- ✔ Solid
- _____ Liquid
- _____ Semi-solid
- _____ Dust/powder
- ✔ Debris
- _____ Sludge
- _____ Gas/Aerosol

Odor
- ✔ None
- _____ Mild
- _____ Strong

Describe _____

Flashpoint N/A
pH N/A
Btu Range N/A
Specific Gravity N/A
Layers? N/A
Color White, brown, Various
Wastewater/non-Wastewater Non-Wastewater

Characteristic?
- _____ D001, Ignitable (Flash point < 140F)
- _____ D002, Corrosive (pH <2.0 or > 12.5)
- _____ D003, Reactive
  - Water Reactive
  - Shock Sensitive
  - Oxidizer
  - Pyrophoric

Explosive
Sulfides
Cyanides
Other

_____D004-D043, Toxic (fail TCLP for specific compounds; if yes are there any UHCs?)
D030 (2,4-dinitrotoluene has the potential to be present if TNT or Composition B which contains TNT.)

___✔____ No Hazardous Characteristic/Non Hazardous

Listed?

_____F (spent solvents)
_____K (generated by specific processes)
_____P (unused commercial chemicals, toxic)
_____U (unused commercial chemicals, acutely toxic)
___✔___ N/A. Not listed

Underlying Hazardous Constituents As noted under composition, the burn residue is tested for RCRA metals, cyanide, sulfide, and initial Ph.

Source of information Generator Knowledge, Lab Reports

Disposal Method
Ash is taken to the on-site Class II landfill under special waste approval

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

April 25, 2019

Appendix D - Ash Analysis

BAE Systems-Holston Army Ammunition

Sample Delivery Group: L1090666

Samples Received: 04/19/2019

Project Number:

Description: Burning Ground Ash Burn Pile 1

Report To: [redacted]

4509 West Stone Drive

Kingsport, TN 37660

Entire Report Reviewed By:

Linda Cashman

Project Manager

BURNING GROUND ASH BURN PILE 1 L1090666-01 Solid

Collected by: Rick Smith
Collected date/time: 04/18/19 09:00
Received date/time: 04/19/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9012B	WG1270932	1	04/25/19 10:41	04/25/19 15:03	JER	Mt. Juliet, TN
Wet Chemistry by Method 9030B	WG1271899	1	04/25/19 09:00	04/25/19 14:50	MJA	Mt. Juliet, TN

BURNING GROUND ASH BURN PILE 1 L1090666-02 Waste

Collected by: Rick Smith
Collected date/time: 04/18/19 09:00
Received date/time: 04/19/19 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Preparation by Method 1311	WG1270724	1	04/23/19 18:10	04/23/19 18:10	CGD	Mt. Juliet, TN
Mercury by Method 7470A	WG1271280	1	04/24/19 16:22	04/24/19 22:16	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1271448	1	04/25/19 10:48	04/25/19 13:44	CCE	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Linda Cashman
Project Manager

Wet Chemistry by Method 9012B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Cyanide	ND		0.250	1	04/25/2019 15:03	WG1270932

Wet Chemistry by Method 9030B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Sulfide	ND		25.0	1	04/25/2019 14:50	WG1271899

Preparation by Method 1311

Analyte	Result	Qualifier	Prep date / time	Batch
TCLP Extraction	-		4/23/2019 6:10:51 PM	WG1270724
Fluid	1		4/23/2019 6:10:51 PM	WG1270724
Initial pH	9.65		4/23/2019 6:10:51 PM	WG1270724
Final pH	6.91		4/23/2019 6:10:51 PM	WG1270724

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis date / time	Batch
	mg/l		mg/l	mg/l			
Mercury	ND		0.0100	0.20	1	04/24/2019 22:16	WG1271280

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis date / time	Batch
	mg/l		mg/l	mg/l			
Arsenic	ND		0.100	5	1	04/25/2019 13:44	WG1271448
Barium	1.86		0.100	100	1	04/25/2019 13:44	WG1271448
Cadmium	ND		0.100	1	1	04/25/2019 13:44	WG1271448
Chromium	ND		0.100	5	1	04/25/2019 13:44	WG1271448
Lead	ND		0.100	5	1	04/25/2019 13:44	WG1271448
Selenium	ND		0.100	1	1	04/25/2019 13:44	WG1271448
Silver	ND		0.100	5	1	04/25/2019 13:44	WG1271448

Method Blank (MB)

(MB) R3405446-1 04/25/19 14:44

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Cyanide	U		0.0390	0.250

L1090465-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1090465-01 04/25/19 14:51 • (DUP) R3405446-3 04/25/19 14:52

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/kg	mg/kg		%		%
Cyanide	ND	0.000	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3405446-2 04/25/19 14:45

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/kg	mg/kg	%	%	
Cyanide	2.50	2.67	107	50.0-150	

Method Blank (MB)

(MB) R3405462-1 04/25/19 14:50

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Sulfide	U		7.63	25.0

Laboratory Control Sample (LCS)

(LCS) R3405462-2 04/25/19 14:50

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfide	100	85.3	85.3	70.0-130	

Method Blank (MB)

(MB) R3405129-1 04/24/19 21:18

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury	U		0.00330	0.0100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3405129-2 04/24/19 21:20 • (LCSD) R3405129-3 04/24/19 21:23

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Mercury	0.0300	0.0290	0.0309	96.6	103	80.0-120			6.36	20

L1090838-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1090838-02 04/24/19 21:25 • (MS) R3405129-4 04/24/19 21:59 • (MSD) R3405129-5 04/24/19 22:01

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.0300	ND	0.0323	0.0340	108	113	1	75.0-125			5.10	20

L1091519-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1091519-04 04/24/19 22:04 • (MS) R3405129-6 04/24/19 22:06 • (MSD) R3405129-7 04/24/19 22:13

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.0300	ND	0.0299	0.0287	99.8	95.5	1	75.0-125			4.41	20

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3405471-1 04/25/19 13:14

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Arsenic	U		0.0330	0.100
Barium	U		0.0330	0.100
Cadmium	U		0.0330	0.100
Chromium	U		0.0330	0.100
Lead	U		0.0330	0.100
Selenium	0.0347	J	0.0330	0.100
Silver	U		0.0330	0.100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3405471-2 04/25/19 13:16 • (LCSD) R3405471-3 04/25/19 13:18

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Arsenic	10.0	9.80	9.76	98.0	97.6	80.0-120			0.415	20
Barium	10.0	10.1	10.1	101	101	80.0-120			0.459	20
Cadmium	10.0	10.1	9.99	101	99.9	80.0-120			0.641	20
Chromium	10.0	9.34	9.24	93.4	92.4	80.0-120			1.06	20
Lead	10.0	10.1	10.0	101	100	80.0-120			0.569	20
Selenium	10.0	10.0	10.1	100	101	80.0-120			0.273	20
Silver	2.00	1.76	1.74	88.2	87.2	80.0-120			1.18	20

L1086664-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1086664-02 04/25/19 13:21 • (MS) R3405471-5 04/25/19 13:26 • (MSD) R3405471-6 04/25/19 13:29

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Arsenic	10.0	ND	9.81	9.73	98.1	97.3	1	75.0-125			0.800	20
Barium	10.0	0.317	10.4	10.4	101	101	1	75.0-125			0.277	20
Cadmium	10.0	ND	10.1	10.1	101	101	1	75.0-125			0.0356	20
Chromium	10.0	ND	9.34	9.32	93.4	93.2	1	75.0-125			0.208	20
Lead	10.0	ND	10.1	10.0	101	100	1	75.0-125			0.918	20
Selenium	10.0	ND	10.1	9.94	101	99.4	1	75.0-125			1.64	20
Silver	2.00	ND	1.77	1.77	88.6	88.6	1	75.0-125			0.0609	20

L1090838-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1090838-02 04/25/19 13:31 • (MS) R3405471-7 04/25/19 13:34 • (MSD) R3405471-8 04/25/19 13:37

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Arsenic	10.0	ND	10.4	10.3	104	103	1	75.0-125			1.20	20
Barium	10.0	0.887	10.5	10.4	96.3	95.3	1	75.0-125			0.925	20
Cadmium	10.0	ND	10.6	10.5	106	105	1	75.0-125			0.741	20
Chromium	10.0	ND	8.94	8.89	89.4	88.9	1	75.0-125			0.510	20
Lead	10.0	ND	10.4	10.3	104	103	1	75.0-125			0.911	20
Selenium	10.0	ND	10.6	10.5	105	104	1	75.0-125			0.434	20
Silver	2.00	ND	1.92	1.90	95.9	95.2	1	75.0-125			0.781	20

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

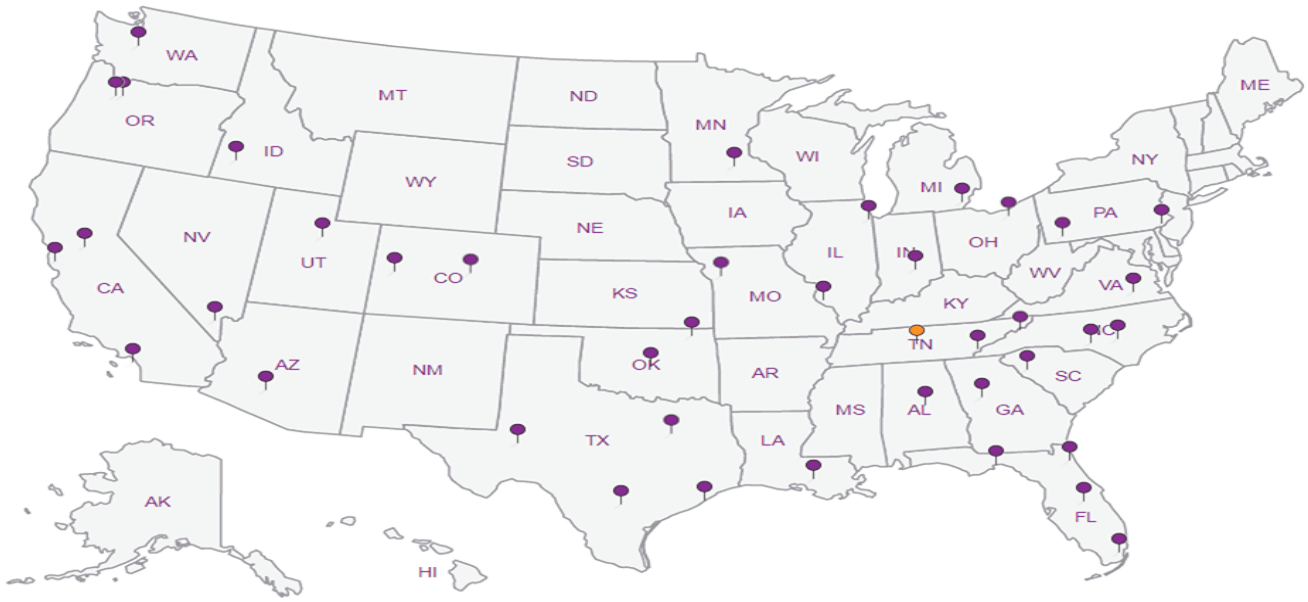
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



BAE Systems - Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, TN 37660

Billing Information:

Report to: [redacted]

Email to: [redacted]

Analysis/Container/Preservative

Chain of Custody
Page 1 of 1

ESC LAB SCIENCES
12065 Lebanon Road
Mt. Juliet, TN 37122
Phone: (800) 767-5859
Phone: (615) 758-5858
Fax: (615) 758-5859

Project Description: Burning Ground Ash BURN PILE #1 | City/State Collected: Kingsport, TN

Phone: [redacted] FAX:

Client Project #:

ESC Key:

Collected by: Rick Smith

Site/Facility ID#:

P.O.#: JAE-~~060118-01~~ 100118-01

Collected by (signature):

Immediately Packed on Ice N (Y)

Rush? (Lab MUST Be Notified)
____ Same Day. 200%
____ Next Day. 100%
____ Two Day 50%
____ Three Day 25%

Date Results Needed:

Email? __No ✓Yes

FAX? __No __Yes

CoCode (lab use only)

Template/Prelogin

Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	TCLP - RCRA 8 Metals	Cyanide	Sulfide	Initial pH				Remarks/Contaminant	Sample # (lab only)
Burning Ground Ash	Comp	SS	x	4/18/2019	9:00AM	1	x	x	x	x					L1090666-01
BURN PILE #1															

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

pH _____ Temp _____

Remarks:

E072

Flow _____ Other _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____	Condition: (lab use only)
Rick Smith	4-18-19	1400	[signature]		RAD SCREEN: <0.5 mR/hr
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 0.5+0=0.5 Bottles Received: 1	CoC Seals Intact: ✓ Y ___ N ___ NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 4/19/19 Time: 0800	pH Checked: NCF:
			B. Maxwell		

Pace Analytical National Center for Testing & Innovation
Cooler Receipt Form

Client: BASSTON	SDG#:	L1090666
Cooler Received/Opened On: 4/19/19	Temperature:	0.5
Received By: Brittany Maxwell		
Signature: B. Maxwell		

Receipt Check List	NP	Yes	No
COC Seal Present / Intact?		✓	
COC Signed / Accurate?		✓	
Bottles arrive intact?		✓	
Correct bottles used?		✓	
Sufficient volume sent?		✓	
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			

Appendix E - TDEC Letter May 2019

STATE OF TENNESSEE
TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
JOHNSON CITY ENVIRONMENTAL FIELD OFFICE
2305 SILVERDALE DRIVE
JOHNSON CITY, TENNESSEE 37601-2162
(423) 854-5400 STATEWIDE 1-888-891-8332 FAX (423) 854-5401

May 9, 2019

Mr. Joseph Kennedy
Commander's Representative
Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, TN 37660

RE: **Hazardous Waste Follow Up Inspection**
Holston Army Ammunition Plant
Hazardous Waste Permit TNHW-148
TN5 21-002-0421

Dear Mr. Kennedy:

On May 8, 2019 the Division of Solid Waste Management (DSWM) conducted a Follow-Up Compliance Evaluation Inspection (CEI) at Holston Army Ammunition Plant (HAAP). During the inspection, the violations cited in the Division's Notice of Violation dated April 8, 2019 were observed to have been corrected or adequately addressed, and no new violations of the Tennessee Hazardous Waste Management Act were identified. Additionally, analytical results associated with the burn pile were reviewed and HAAP may continue disposal as a special waste.

This letter will acknowledge the facility's return to compliance. The DSWM appreciates the courtesy and cooperation shown by Holston Army Ammunition Plant during the inspection. Should you have any questions concerning this report, please do not hesitate to contact me at 423/854-5465 or by email: John.C.Webb@tn.gov.

Sincerely,

John Webb, PE
Environmental Consultant II
Division of Solid Waste Management
Johnson City Environmental Field Office

cc: Billy Shelton, BAE (electronic)
Ashley Holt, DSWM/Nashville (electronic)
Central File, DSWM/Nashville (electronic)
Enforcement Section, DSWM/Nashville (electronic)

NECESSARY OIL COMPANY
1300 Georgia Avenue
Bristol, TN 37620
(423) 764-4533 • (423) 764-2175

9-7-17

EMERGENCY CONTACT: 1-423-764-4533

US EPA ID NUMBER
TND-987789302
VAD-034556480

RT-8

CERTIFIED MANIFEST/INVOICE

No. 211132

BILL TO: Appalachian Tank Car
P.O Box 3247
Lynchburg, Va 24503
[redacted]

GENERATOR/CUSTOMER
BAE Systems
4509 W Stone Drive
Kingsport, Tn 37660
Logan [redacted]

	PROPER SHIPPING NAME DESCRIPTION				Unit	Estimated Quantity	Actual Quantity	Unit Price	Total Price
	Fuel Oil				Gls.				
	Used Antifreeze								
	Used Oil								
	Used Oil & Water Mix								
	Water Soluble Oil								
	Petroleum Contact Water								
	Used Oil Filters					3	3	[redacted]	
	Empty Drums								
	Contaminated Absorbent [redacted]								
	Clean absorbent								
	Absorbent Setup (1 Clean ABS & Empty Drum)								
	Sludge								
	Fuel Service Truck Charge						1	[redacted]	
*	CLOR-D-TECT Performed: Date						Driver ID		
							Total	Due	[redacted]
	Total Drums Pumped								
	Leave Replacement Drums								

ARRIVAL TIME	DEPART TIME	CASH	CHARGE	CHECK NO.	C.O.D.	P.O. REQ'D	CUSTOMER P.O. #
							LLL-090617-04

TRANSPORTER/RECYCLER/CERTIFICATION

THIS IS TO CERTIFY THE ABOVE DESCRIBED MATERIALS HAVE BEEN PICKED UP AND WILL BE TRANSPORTED, TREATED, REPROCESSED AND/OR DISPOSED OF IN A MANNER PURSUANT TO ALL FEDERAL, STATE AND LOCAL GUIDELINES.

[signature] 9-11-17 Mack
DRIVER'S SIGNATURE DATE TRUCK TRAILER #

PO#LLL-09617-04

THIS IS TO CERTIFY THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED, AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

PER _____

COMMENTS Left 1-Drum Top

BY MY SIGNATURE BELOW I ACKNOWLEDGE AND AGREE WITH THE ABOVE AND FURTHER ACKNOWLEDGE THAT I HAVE READ AND AGREE TO THE PROVISIONS AND TERMS SET FORTH ON THE REVERSE SIDE OF THIS MANIFEST.

[signature] Environmental Affairs 9-11-17
CUSTOMER SIGNATURE TITLE DATE

WHITE - ORIGINAL COPY YELLOW - ACCOUNTING COPY PINK - CUSTOMER COPY

NECESSARY OIL COMPANY
1300 Georgia Avenue
Bristol, TN 37620
(423) 764-4533 • (423) 764-2175

7-5-17

EMERGENCY CONTACT: 1-423-764-4533

US EPA ID NUMBER
TND-987789302
VAD-034556480

RT-8

CERTIFIED MANIFEST/INVOICE

No. 211346

BILL TO: BAE SYSTEM ORONANCE SYSTEMS
Accounts Payable
4509 W STONE DRIVE
KINGSPORT, TN 37660
[redacted]

GENERATOR/CUSTOMER
BAE SYSTEMS
4509 W STONE DRIVE
Building B[redacted]
Kingsport TN 37660
Contact Is [redacted]

	PROPER SHIPPING NAME DESCRIPTION		Unit	Estimated Quantity	Actual Quantity	Unit Price	Total Price
	Fuel Oil		Gls.				
	Used Antifreeze						
	Used Oil				(6)	[redacted]	
	Used Oil & Water Mix	After Checking In Drums					
	Water Soluble Oil						
	Petroleum Contact Water						
	Used Oil Filters	There Was 5 used Oil Drums			5	[redacted]	
	Empty Drums	And 1 Drum with Sludge			1		
	Contaminated Absorbent						
	Clean absorbent						
	Absorbent Setup (1 Clean ABS & Empty Drum)						
	Sludge						
	Service Truck Charge				1	[redacted]	
*	CLOR-D-TECT Performed: Date				Driver ID		
	NO REPLACEMENTS						
					TOTAL DUE		[redacted]
	Total Drums Pumped						
	Leave Replacement Drums						

ARRIVAL TIME	DEPART TIME	CASH	CHARGE	CHECK NO.	C.O.D.	P.O. REQ'D	CUSTOMER P.O. #
							JAE-062917-06

TRANSPORTER/RECYCLER/CERTIFICATION

THIS IS TO CERTIFY THE ABOVE DESCRIBED MATERIALS HAVE BEEN PICKED UP AND WILL BE TRANSPORTED, TREATED, REPROCESSED AND/OR DISPOSED OF IN A MANNER PURSUANT TO ALL FEDERAL, STATE AND LOCAL GUIDELINES.

CDM — DRIVER'S SIGNATURE
7-5-17 — DATE
(1) 15424 — TRUCK TRAILER #

THIS IS TO CERTIFY THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED, AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

PER _____

COMMENTS JOANN WILL adjust P.O.
(1) HAD A BUNCH OF GREASE/SLUDGE DH
01572

BY MY SIGNATURE BELOW I ACKNOWLEDGE AND AGREE WITH THE ABOVE AND FURTHER ACKNOWLEDGE THAT I HAVE READ AND AGREE TO THE PROVISIONS AND TERMS SET FORTH ON THE REVERSE SIDE OF THIS MANIFEST.

X [signature] — CUSTOMER SIGNATURE
TITLE
7-5-17 — DATE

WHITE - ORIGINAL COPY YELLOW - ACCOUNTING COPY PINK - CUSTOMER COPY

NECESSARY OIL COMPANY

NECESSARY OIL COMPANY
1300 Georgia Avenue
Bristol, TN 37620
(423) 764-4533 • (423) 764-2175

6-29-16

EMERGENCY CONTACT: 1-423-764-4533

US EPA ID NUMBER
TND-987789302
VAD-034556480

RT-4

CERTIFIED MANIFEST/INVOICE

No. 213765

BILL TO: Same As Generator Side

GENERATOR/CUSTOMER
BAE SYSTEMS INC
4509 WEST STONE DRIVE
Kingsport, TN 37660
Contact: [redacted]

[redacted]

	PROPER SHIPPING NAME DESCRIPTION				Unit	Estimated Quantity	Actual Quantity	Unit Price	Total Price
	Fuel Oil				Gls.	[redacted]	200	[redacted]	
	Used Antifreeze								
	Used Oil								
	Used Oil & Water Mix								
	Water Soluble Oil								
	Petroleum Contact Water								
	Used Oil Filters								
	Empty Drums								
	Contaminated Absorbent								
	Clean absorbent								
	Absorbent Setup (1 Clean ABS & E								
	Sludge								
	Service Truck						1	[redacted]	
*	CLOR-D-TECT							Driver ID	
	Total Drums Pumped								
	Leave Replacement Drums								

Charlie Did Not Get Sample

We Can not Charge For Water Content

Mail PO Form with Invoice. I made Copy & Attached TO state manifest

ARRIVAL TIME	DEPART TIME	CASH	CHARGE	CHECK NO.	C.O.D.	P.O. REQ'D	CUSTOMER P.O. #
							JAE-062816-02

TRANSPORTER/RECYCLER/CERTIFICATION

THIS IS TO CERTIFY THE ABOVE DESCRIBED MATERIALS HAVE BEEN PICKED UP AND WILL BE TRANSPORTED, TREATED, REPROCESSED AND/OR DISPOSED OF IN A MANNER PURSUANT TO ALL FEDERAL, STATE AND LOCAL GUIDELINES.

CDye — 7-5-16 — 63

DRIVER'S SIGNATURE | DATE | TRUCK TRAILER #

THIS IS TO CERTIFY THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED, AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

PER _____

COMMENTS _____

BY MY SIGNATURE BELOW I ACKNOWLEDGE AND AGREE WITH THE ABOVE AND FURTHER ACKNOWLEDGE THAT I HAVE READ AND AGREE TO THE PROVISIONS AND TERMS SET FORTH ON THE REVERSE SIDE OF THIS MANIFEST.

X Ford Bailey — Environmental — 7-5-16

CUSTOMER SIGNATURE | TITLE | DATE

WHITE ORIGINAL COPY YELLOW ACCOUNTING COPY PINK CUSTOMER COPY

NECESSARY OIL COMPANY

NECESSARY OIL COMPANY
1300 Georgia Avenue
Bristol, TN 37620
(423) 764-4533 • (423) 764-2175

11-15-16 [redacted]

EMERGENCY CONTACT: 1-423-764-4533

259182

US EPA ID NUMBER
TND-987789302
VAD-034556480

RTE 4 SHIT.TVAN

CERTIFIED MANIFEST/INVOICE

No. 259226 [redacted]

BILL TO:
BAE SYSTEMS, ORDNANCE SYSTEMS INC
ACCOUNTS PAYABLE
4509 W. STONE DRIVE
KINGSPORT TN 37660
[redacted]

GENERATOR/CUSTOMER
BAE SYSTEMS
4509 W. STONE DRIVE
BLDG. [redacted]
KINGSPORT TN [redacted]
[redacted]
Wait For Confirmation
Another Pick Up [redacted]

	PROPER SHIPPING NAME DESCRIPTION				Unit	Estimated Quantity	Actual Quantity	Unit Price	Total Price
	Fuel Oil				Gls.		188.36	[redacted]	
	Used Antifreeze						200		
	Used Oil								
	Used Oil & Water Mix								
	Water Soluble Oil								
	Petroleum Contact Water W/W = 5.82%						11.64 GD	[redacted]	
	Used Oil Filters								
	Empty Drums								
	Contaminated Absorbent						259226		
	Clean absorbent								
	Absorbent Setup (1 Clean ABS & Empty Drum)								
	Sludge								
						5.82			
	Service Truck Fee						1	[redacted]	
						Total Drums		# [redacted]	
*	CLOR-D-TECT Performed: Date							Driver ID	
	Total Drums Pumped								
	Leave Replacement Drums								

ARRIVAL TIME	DEPART TIME	CASH	CHARGE	CHECK NO.	C.O.D.	P.O. REQ'D	CUSTOMER P.O. #
							JAF-11-15-16-03

TRANSPORTER/RECYCLER/CERTIFICATION

THIS IS TO CERTIFY THE ABOVE DESCRIBED MATERIALS HAVE BEEN PICKED UP AND WILL BE TRANSPORTED, TREATED, REPROCESSED AND/OR DISPOSED OF IN A MANNER PURSUANT TO ALL FEDERAL, STATE AND LOCAL GUIDELINES.

CDYL 12-1-16 63

DRIVER'S SIGNATURE DATE TRUCK TRAILER #

B 4827 G 6854

THIS IS TO CERTIFY THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED, AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

PER

COMMENTS [redacted] Truck

BY MY SIGNATURE BELOW I ACKNOWLEDGE AND AGREE WITH THE ABOVE AND FURTHER ACKNOWLEDGE THAT I HAVE READ AND AGREE TO THE PROVISIONS AND TERMS SET FORTH ON THE REVERSE SIDE OF THIS MANIFEST.

X Ann Barker 12-1-16

CUSTOMER SIGNATURE TITLE DATE

WHITE - ORIGINAL COPY YELLOW - ACCOUNTING COPY PINK - CUSTOMER COPY

NECESSARY OIL COMPANY
1300 Georgia Avenue
Bristol, TN 37620
(423) 764-4533 • (423) 764-2175

5-15-17 MUST CALL AHEAD WAY AHEAD

EMERGENCY CONTACT: 1-423-764-4533

259751

US EPA ID NUMBER
TND-987789302
VAD-034556480

RTB 4 SHUTTVAN

CERTIFIED MANIFEST/INVOICE No. 259751

BILL TO:
BAE SYSTEMS, ORDNANCE SYSTEMS INC
ACCOUNTS PAYABLE
4509 W. STONE DRIVE
KINGSPORT TN 37660
[redacted]

GENERATOR/CUSTOMER
BAE SYSTEMS
4509 W. STONE DRIVE
BLDG. [redacted]
KINGSPORT TN
[redacted]
CALL AHEAD

	PROPER SHIPPING NAME DESCRIPTION				Unit	Estimated Quantity	Actual Quantity	Unit Price	Total Price
	Fuel Oil				Gls.				
	Used Antifreeze								
	Used Oil								
	Used Oil & Water Mix								
	Water Soluble Oil								
	Petroleum Contact Water					300?	250	[redacted]	
	Used Oil Filters								
	Empty Drums								
	Contaminated Absorbent								
	Clean absorbent								
	Absorbent Setup (1 Clean ABS & Empty Drum)								
	Sludge								
	Service Truck Charge						1	[redacted]	
*	CLOR-D-TECT Performed: Date						Driver ID		
		Driver Is Required					TOTAL	DUE	[redacted]
		To Collect A Sample							
	Total Drums Pumped	At Each Pump							
	Leave Replacement Drums	Location.							

ARRIVAL TIME	DEPART TIME	CASH	CHARGE	CHECK NO.	C.O.D.	P.O. REQ'D	CUSTOMER P.O. #
							JAE11071603

TRANSPORTER/RECYCLER/CERTIFICATION

THIS IS TO CERTIFY THE ABOVE DESCRIBED MATERIALS HAVE BEEN PICKED UP AND WILL BE TRANSPORTED, TREATED, REPROCESSED AND/OR DISPOSED OF IN A MANNER PURSUANT TO ALL FEDERAL, STATE AND LOCAL GUIDELINES.

[signature] 5-16-17 26
DRIVER'S SIGNATURE DATE TRUCK TRAILER #

B 4827 G 6854

THIS IS TO CERTIFY THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED, AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

PER _____

COMMENTS _____

BY MY SIGNATURE BELOW I ACKNOWLEDGE AND AGREE WITH THE ABOVE AND FURTHER ACKNOWLEDGE THAT I HAVE READ AND AGREE TO THE PROVISIONS AND TERMS SET FORTH ON THE REVERSE SIDE OF THIS MANIFEST.

[signature] Env Sp. 5/16/17
CUSTOMER SIGNATURE TITLE DATE

WHITE - ORIGINAL COPY YELLOW - ACCOUNTING COPY PINK - CUSTOMER COPY

NECESSARY OIL COMPANY

NECESSARY OIL COMPANY
1300 Georgia Avenue
Bristol, TN 37620
(423) 764-4533 • (423) 764-2175

5-24-17

EMERGENCY CONTACT: 1-423-764-4533

259800

US EPA ID NUMBER
TND-987789302
VAD-034556480

RTE 4 SULLIVAN

CERTIFIED MANIFEST/INVOICE No. 259800

BILL TO:
BAE SYSTEMS, ORDNANCE SYSTEMS INC
ACCOUNTS PAYABLE
4509 W. STONE DRIVE
KINGSPORT TN 37660
[redacted]

GENERATOR/CUSTOMER
BAE SYSTEMS
4509 W. STONE DRIVE
BLDG. [redacted]
KINGSPORT TN
[redacted]
Daniel [redacted]
CALL @ GATE

	PROPER SHIPPING NAME DESCRIPTION				Unit	Estimated Quantity	Actual Quantity	Unit Price	Total Price
	Fuel Oil				Gls.				
	Used Antifreeze								
	Used Oil								
	Used Oil & Water Mix								
	Water Soluble Oil								
	Petroleum Contact Water					400 ?	400	[redacted]	
	Used Oil Filters								
	Empty Drums								
	Contaminated Absorbent								
	Clean absorbent								
	Absorbent Setup (1 Clean ABS & Empty Drum)								
	Sludge								
	Service Truck Charge						1	[redacted]	
*	CLOR-D-TECT Performed: Date						Driver ID		
		Driver Is Required					TOTAL DUE		[redacted]
		To Collect A Sample							
		At Each Pump							
	Total Drums Pumped								
	Leave Replacement Drums	Location							

ARRIVAL TIME	DEPART TIME	CASH	CHARGE	CHECK NO.	C.O.D.	P.O. REQ'D	CUSTOMER P.O. #
							JAE11071603

TRANSPORTER/RECYCLER/CERTIFICATION

THIS IS TO CERTIFY THE ABOVE DESCRIBED MATERIALS HAVE BEEN PICKED UP AND WILL BE TRANSPORTED, TREATED, REPROCESSED AND/OR DISPOSED OF IN A MANNER PURSUANT TO ALL FEDERAL, STATE AND LOCAL GUIDELINES.

DRIVER'S SIGNATURE 5-26-17 DATE 27 TRUCK TRAILER #

B 4827 G 6854

THIS IS TO CERTIFY THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED, AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

PER

COMMENTS

BY MY SIGNATURE BELOW I ACKNOWLEDGE AND AGREE WITH THE ABOVE AND FURTHER ACKNOWLEDGE THAT I HAVE READ AND AGREE TO THE PROVISIONS AND TERMS SET FORTH ON THE REVERSE SIDE OF THIS MANIFEST.

Thomas Stamper

CUSTOMER SIGNATURE TITLE DATE

WHITE - ORIGINAL COPY YELLOW - ACCOUNTING COPY PINK - CUSTOMER COPY

NECESSARY OIL
COMPANY
1300 Georgia Avenue
Bristol, TN 37620
(423) 764-4533 • (423) 764-2175

7-21-16

EMERGENCY CONTACT: 1-423-764-4533

261205

US EPA ID NUMBER
TND-987789302
VAD-034556480

RTE 4 SHUTTLVAN

CERTIFIED MANIFEST/INVOICE No. 261205

BILL TO:
BAE SYSTEMS, ORDNANCE SYSTEMS INC
ACCOUNTS PAYABLE
4509 W. STONE DRIVE
KINGSPORT TN 37660
[redacted]

GENERATOR/CUSTOMER
BAE SYSTEMS
4509 W. STONE DRIVE
BLDG. [redacted]
KINGSPORT TN [redacted]
CONTACT [redacted]

	PROPER SHIPPING NAME DESCRIPTION				Unit	Estimated Quantity	Actual Quantity	Unit Price	Total Price
	Fuel Oil				Gls.				
	Used Antifreeze						450	[redacted]	
	Used Oil					1,000			
	Used Oil & Water Mix								
	Water Soluble Oil								
	Petroleum Contact Water								
	Used Oil Filters								
	Empty Drums								
	Contaminated Absorbent								
	Clean absorbent								
	Absorbent Setup (1 Clean ABS & Empty Drum)								
	Sludge								
	Service Truck charge					Total	Dys	[redacted]	[redacted]
*	CLOR-D-TECT Performed: Date						Driver ID		
		NEED SAMPLE							
	Total Drums Pumped								
	Leave Replacement Drums								

ARRIVAL TIME	DEPART TIME	CASH	CHARGE	CHECK NO.	C.O.D.	P.O. REQ'D	CUSTOMER P.O. #
							JAE-072016-04

TRANSPORTER/RECYCLER/CERTIFICATION

THIS IS TO CERTIFY THE ABOVE DESCRIBED MATERIALS HAVE BEEN PICKED UP AND WILL BE TRANSPORTED, TREATED, REPROCESSED AND/OR DISPOSED OF IN A MANNER PURSUANT TO ALL FEDERAL, STATE AND LOCAL GUIDELINES.

CDL 7-21-16 63
DRIVER'S SIGNATURE DATE TRUCK TRAILER #

B 4827 G 6854

THIS IS TO CERTIFY THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED, AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

PER _____

COMMENTS _____

BY MY SIGNATURE BELOW I ACKNOWLEDGE AND AGREE WITH THE ABOVE AND FURTHER ACKNOWLEDGE THAT I HAVE READ AND AGREE TO THE PROVISIONS AND TERMS SET FORTH ON THE REVERSE SIDE OF THIS MANIFEST.

X T. Pam Bailey Environmental 7-21-16
CUSTOMER SIGNATURE TITLE DATE

WHITE - ORIGINAL COPY YELLOW - ACCOUNTING COPY PINK - CUSTOMER COPY

ANALYTICAL REPORT

October 13, 2015

Appendix G Combined Burning Ground Oil Samples

BAE Systems-Holston Army Ammunition

Sample Delivery Group:	L792656
Samples Received:	10/06/2015
Project Number:	
Description:	October Waste Oil T2

Report To: [redacted]

4509 West Stone Drive

Kingsport, TN 37660

Entire Report Reviewed By:

Linda Cashman

Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

T2USED OIL SAMPLE L792656-01 Waste

Collected by: Paul Bailey
Collected date/time: 10/05/15 13:00
Received date/time: 10/06/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Mercury by Method 7470A	WG820579	1	10/08/15 09:42	10/08/15 18:33	TRB
Metals (ICP) by Method 6010B	WG820585	1	10/08/15 10:28	10/08/15 13:26	WBD
Preparation by Method 1311	WG820245	1	10/07/15 11:37	10/07/15 13:51	CHM
Preparation by Method 1311	WG820421	1	10/07/15 18:41	10/07/15 18:42	LJN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG820717	1	10/08/15 17:45	10/09/15 20:19	ADF
Volatile Organic Compounds (GC/MS) by Method 8260B	WG820640	1	10/09/15 02:59	10/09/15 02:59	KLO

T2USED OIL SAMPLE L792656-02 Solid

Collected by: Paul Bailey
Collected date/time: 10/05/15 13:00
Received date/time: 10/06/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG820486	1	10/08/15 21:34	10/09/15 11:30	TD

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

[Preliminary Report]

Linda Cashman
Technical Service Representative

Preparation by Method 1311

Analyte	Result	Qualifier	Prep date / time	Batch
TCLP Extraction	-		10/7/2015 11:37:47 AM	WG820245
TCLP ZHE Extraction	-		10/7/2015 6:41:51 PM	WG820421

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.0100	0.20	1	10/08/2015 18:33	WG820579

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.450	5	1	10/08/2015 13:26	WG820585
Barium	ND		1.35	100	1	10/08/2015 13:26	WG820585
Cadmium	ND		0.450	1	1	10/08/2015 13:26	WG820585
Chromium	ND		0.450	5	1	10/08/2015 13:26	WG820585
Lead	ND		0.450	5	1	10/08/2015 13:26	WG820585
Selenium	ND		0.450	1	1	10/08/2015 13:26	WG820585
Silver	ND		0.450	5	1	10/08/2015 13:26	WG820585

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.0500	0.50	1	10/09/2015 02:59	WG820640
Carbon tetrachloride	ND		0.0500	0.50	1	10/09/2015 02:59	WG820640
Chlorobenzene	ND		0.0500	100	1	10/09/2015 02:59	WG820640
Chloroform	ND		0.250	6	1	10/09/2015 02:59	WG820640
1,2-Dichloroethane	ND		0.0500	0.50	1	10/09/2015 02:59	WG820640
1,1-Dichloroethene	ND		0.0500	0.70	1	10/09/2015 02:59	WG820640
2-Butanone (MEK)	ND		0.500	200	1	10/09/2015 02:59	WG820640
Tetrachloroethene	ND		0.0500	0.70	1	10/09/2015 02:59	WG820640
Trichloroethene	ND		0.0500	0.50	1	10/09/2015 02:59	WG820640
Vinyl chloride	ND		0.0500	0.20	1	10/09/2015 02:59	WG820640
(S) Toluene-d8	*104*		*90.0-115*	*114*		*10/09/2015 02:59*	WG820640
(S) Dibromofluoromethane	*102*		*79.0-121*	*125*		*10/09/2015 02:59*	WG820640
(S) a,a,a-Trifluorotoluene	*107*		*90.4-116*	*114*		*10/09/2015 02:59*	WG820640
(S) 4-Bromofluorobenzene	*105*		*80.1-120*	*128*		*10/09/2015 02:59*	WG820640

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
1,4-Dichlorobenzene	ND		0.100	7.50	1	10/09/2015 20:19	WG820717
2,4-Dinitrotoluene	ND		0.100	0.13	1	10/09/2015 20:19	WG820717
Hexachlorobenzene	ND		0.100	0.13	1	10/09/2015 20:19	WG820717
Hexachloro-1,3-butadiene	ND		0.100	0.50	1	10/09/2015 20:19	WG820717
Hexachloroethane	ND		0.100	3	1	10/09/2015 20:19	WG820717
Nitrobenzene	ND		0.100	2	1	10/09/2015 20:19	WG820717
Pyridine	ND		0.100	5	1	10/09/2015 20:19	WG820717
3&4-Methyl Phenol	ND		0.100	400	1	10/09/2015 20:19	WG820717
2-Methylphenol	ND		0.100	200	1	10/09/2015 20:19	WG820717
Pentachlorophenol	ND		0.100	100	1	10/09/2015 20:19	WG820717
2,4,5-Trichlorophenol	ND		0.100	400	1	10/09/2015 20:19	WG820717
2,4,6-Trichlorophenol	ND		0.100	2	1	10/09/2015 20:19	WG820717
(S) 2-Fluorophenol	*52.0*		*10.0-77.9*	*87*		*10/09/2015 20:19*	WG820717
(S) Phenol-d5	*38.5*		*5.00-70.1*	*67*		*10/09/2015 20:19*	WG820717

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
(S) Nitrobenzene-d5	*56.9*		*21.8-123*	*120*		*10/09/2015 20:19*	WG820717
(S) 2-Fluorobiphenyl	*63.6*		*29.5-131*	*122*		*10/09/2015 20:19*	WG820717
(S) 2,4,6-Tribromophenol	*60.6*		*11.2-130*	*148*		*10/09/2015 20:19*	WG820717
(S) p-Terphenyl-d14	*72.7*		*29.3-137*	*149*		*10/09/2015 20:19*	WG820717

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	10/09/2015 11:30	WG820486
PCB 1221	ND		1.00	1	10/09/2015 11:30	WG820486
PCB 1232	ND		1.00	1	10/09/2015 11:30	WG820486
PCB 1242	ND		1.00	1	10/09/2015 11:30	WG820486
PCB 1248	ND		1.00	1	10/09/2015 11:30	WG820486
PCB 1254	ND		1.00	1	10/09/2015 11:30	WG820486
PCB 1260	ND		1.00	1	10/09/2015 11:30	WG820486
(S) Decachlorobiphenyl	*85.5*		*60.0-140*		*10/09/2015 11:30*	WG820486
(S) Tetrachloro-m-xylene	*89.0*		*60.0-140*		*10/09/2015 11:30*	WG820486

Method Blank (MB)

(MB) 10/08/15 17:59

Analyte	MB Result	MB Qualifier	MB RDL
	mg/l		mg/l
Mercury	ND		0.0100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 10/08/15 18:01 • (LCSD) 10/08/15 18:04

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Mercury	0.0300	0.0257	0.0264	86	88	80-120			3	20

L792475-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 10/08/15 18:06 • (MS) 10/08/15 18:08 • (MSD) 10/08/15 18:15

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.0300	ND	0.0252	0.0258	84	86	1	75-125			2	20

L792836-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 10/08/15 18:17 • (MS) 10/08/15 18:19 • (MSD) 10/08/15 18:21

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.0300	0.00299	0.0254	0.0192	75	54	1	75-125		J3 J6	28	20

Method Blank (MB)

(MB) 10/08/15 12:32

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Arsenic	ND		0.450
Barium	ND		1.35
Cadmium	ND		0.450
Chromium	ND		0.450
Lead	ND		0.450
Selenium	ND		0.450
Silver	ND		0.450

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 10/08/15 12:35 • (LCSD) 10/08/15 12:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	9.00	9.06	9.14	101	102	80-120			1	20
Barium	9.00	9.09	9.05	101	101	80-120			0	20
Cadmium	9.00	9.21	9.21	102	102	80-120			0	20
Chromium	9.00	9.09	9.12	101	101	80-120			0	20
Lead	9.00	9.01	9.09	100	101	80-120			1	20
Selenium	9.00	9.58	9.64	106	107	80-120			1	20
Silver	9.00	9.07	9.05	101	101	80-120			0	20

L792475-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 10/08/15 12:41 • (MS) 10/08/15 12:47 • (MSD) 10/08/15 12:50

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	9.00	0.0751	9.56	9.52	105	105	1	75-125			0	20
Barium	9.00	1.12	10.0	10.0	99	99	1	75-125			0	20
Cadmium	9.00	ND	9.43	9.42	105	105	1	75-125			0	20
Chromium	9.00	0.0124	9.01	9.06	100	101	1	75-125			1	20
Lead	9.00	0.000635	9.14	9.09	102	101	1	75-125			1	20
Selenium	9.00	0.177	10.2	10.3	111	112	1	75-125			1	20
Silver	9.00	ND	9.25	9.29	103	103	1	75-125			0	20

Method Blank (MB)

(MB) 10/08/15 23:13

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Benzene	ND		0.0500
Carbon tetrachloride	ND		0.0500
Chlorobenzene	ND		0.0500
Chloroform	ND		0.250
1,2-Dichloroethane	ND		0.0500
1,1-Dichloroethene	ND		0.0500
2-Butanone (MEK)	ND		0.500
Tetrachloroethene	ND		0.0500
Trichloroethene	ND		0.0500
Vinyl chloride	ND		0.0500
(S) Toluene-d8	*104*		*90.0-115*
(S) Dibromofluoromethane	*99.2*		*79.0-121*
(S) a,a,a-Trifluorotoluene	*107*		*90.4-116*
(S) 4-Bromofluorobenzene	*105*		*80.1-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 10/08/15 22:05 • (LCSD) 10/08/15 23:58

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0243	0.0247	97.2	98.9	73.0-122			1.70	20
Carbon tetrachloride	0.0250	0.0228	0.0232	91.3	92.7	70.9-129			1.56	20
Chlorobenzene	0.0250	0.0255	0.0252	102	101	79.7-122			1.10	20
Chloroform	0.0250	0.0240	0.0244	96.2	97.4	73.2-125			1.29	20
1,2-Dichloroethane	0.0250	0.0235	0.0239	94.1	95.7	65.3-126			1.69	20
1,1-Dichloroethene	0.0250	0.0251	0.0256	101	103	60.6-133			1.96	20
2-Butanone (MEK)	0.125	0.103	0.106	82.6	85.0	46.4-155			2.82	20
Tetrachloroethene	0.0250	0.0258	0.0253	103	101	73.5-130			1.92	20
Trichloroethene	0.0250	0.0254	0.0255	102	102	79.5-121			0.130	20
Vinyl chloride	0.0250	0.0248	0.0248	99.3	99.2	61.5-134			0.120	20
(S) Toluene-d8				*105*	*105*	*90.0-115*				
(S) Dibromofluoromethane				*106*	*104*	*79.0-121*				
(S) a,a,a-Trifluorotoluene				*106*	*107*	*90.4-116*				
(S) 4-Bromofluorobenzene				*107*	*105*	*80.1-120*				

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

L792467-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 10/09/15 01:28 • (MS) 10/09/15 00:20 • (MSD) 10/09/15 00:43

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	1.25	0.00245	1.18	1.23	94.0	97.9	1	58.6-133			4.11	20
Carbon tetrachloride	1.25	ND	1.25	1.29	99.6	104	1	60.6-139			3.87	20
Chlorobenzene	1.25	ND	1.24	1.30	99.1	104	1	70.1-130			4.83	20
Chloroform	1.25	ND	1.18	1.21	94.4	97.1	1	66.1-133			2.86	20
1,2-Dichloroethane	1.25	ND	1.16	1.18	92.4	94.2	1	60.7-132			1.88	20
1,1-Dichloroethene	1.25	ND	1.24	1.22	99.0	97.3	1	48.8-144			1.77	20
2-Butanone (MEK)	6.25	0.0710	4.76	4.56	75.1	71.8	1	45.0-156			4.36	20.8
Tetrachloroethene	1.25	ND	1.22	1.30	97.2	104	1	57.4-141			6.34	20
Trichloroethene	1.25	ND	1.22	1.24	97.4	99.5	1	48.9-148			2.19	20
Vinyl chloride	1.25	ND	1.20	1.22	95.9	97.8	1	44.3-143			1.94	20
(S) Toluene-d8					*105*	*104*		*90.0-115*				
(S) Dibromofluoromethane					*104*	*103*		*79.0-121*				
(S) a,a,a-Trifluorotoluene					*105*	*107*		*90.4-116*				
(S) 4-Bromofluorobenzene					*106*	*106*		*80.1-120*				

Method Blank (MB)

(MB) 10/09/15 10:21

Analyte	MB Result mg/kg	MB Qualifier	MB RDL mg/kg
PCB 1260	ND		1.00
PCB 1016	ND		1.00
PCB 1221	ND		1.00
PCB 1232	ND		1.00
PCB 1242	ND		1.00
PCB 1248	ND		1.00
PCB 1254	ND		1.00
(S) Decachlorobiphenyl	*100*		*60.0-140*
(S) Tetrachloro-m-xylene	*103*		*60.0-140*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 10/09/15 10:34 • (LCSD) 10/09/15 10:48

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
PCB 1260	0.500	0.453	0.456	90.5	91.3	60.0-140			0.820	20
PCB 1016	0.500	0.446	0.445	89.2	89.0	60.0-140			0.260	20
(S) Decachlorobiphenyl				*105*	*108*	*60.0-140*				
(S) Tetrachloro-m-xylene				*104*	*105*	*60.0-140*				

Method Blank (MB)

(MB) 10/09/15 19:56

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
1,4-Dichlorobenzene	ND		0.100
2,4-Dinitrotoluene	ND		0.100
Hexachlorobenzene	ND		0.100
Hexachloro-1,3-butadiene	ND		0.100
Hexachloroethane	ND		0.100
Nitrobenzene	ND		0.100
Pyridine	ND		0.100
2-Methylphenol	ND		0.100
3&4-Methyl Phenol	ND		0.100
Pentachlorophenol	ND		0.100
2,4,5-Trichlorophenol	ND		0.100
2,4,6-Trichlorophenol	ND		0.100
(S) Nitrobenzene-d5	*52.5*		*21.8-123*
(S) 2-Fluorobiphenyl	*61.5*		*29.5-131*
(S) p-Terphenyl-d14	*67.8*		*29.3-137*
(S) Phenol-d5	*33.1*		*5.00-70.1*
(S) 2-Fluorophenol	*45.0*		*10.0-77.9*
(S) 2,4,6-Tribromophenol	*56.9*		*11.2-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 10/09/15 18:47 • (LCSD) 10/09/15 19:10

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,4-Dichlorobenzene	0.0500	0.0241	0.0248	48.2	49.6	21.0-89.4			2.97	32.6
2,4-Dinitrotoluene	0.0500	0.0395	0.0412	79.1	82.4	31.2-105			4.11	22
Hexachlorobenzene	0.0500	0.0374	0.0400	74.8	80.1	38.5-116			6.79	20.1
Hexachloro-1,3-butadiene	0.0500	0.0267	0.0280	53.4	56.1	16.1-104			4.92	31.2
Hexachloroethane	0.0500	0.0239	0.0246	47.9	49.1	16.5-89.8			2.60	30.7
Nitrobenzene	0.0500	0.0320	0.0338	64.0	67.7	31.4-106			5.59	25.7
Pyridine	0.0500	0.0156	0.0161	31.1	32.1	13.5-58.9			3.14	32.5
2-Methylphenol	0.0500	0.0279	0.0309	55.7	61.8	26.4-86.9			10.4	26.5
3&4-Methyl Phenol	0.0500	0.0312	0.0344	62.3	68.8	27.9-92.0			9.91	27
Pentachlorophenol	0.0500	0.0375	0.0406	75.0	81.2	10.0-97.4			7.99	35.1
2,4,5-Trichlorophenol	0.0500	0.0388	0.0411	77.7	82.2	34.9-112			5.67	23.9
2,4,6-Trichlorophenol	0.0500	0.0387	0.0398	77.3	79.7	29.8-107			3.01	24.1

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 10/09/15 18:47 • (LCSD) 10/09/15 19:10

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) Nitrobenzene-d5				*60.3*	*62.8*	*21.8-123*				
(S) 2-Fluorobiphenyl				*71.5*	*73.5*	*29.5-131*				
(S) p-Terphenyl-d14				*70.5*	*76.6*	*29.3-137*				
(S) Phenol-d5				*33.7*	*39.4*	*5.00-70.1*				
(S) 2-Fluorophenol				*46.6*	*48.8*	*10.0-77.9*				
(S) 2,4,6-Tribromophenol				*79.2*	*86.1*	*11.2-130*				

L792794-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 10/09/15 22:15 • (MS) 10/09/15 22:38 • (MSD) 10/09/15 23:01

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
1,4-Dichlorobenzene	0.500	ND	0.260	0.259	52.0	51.7	1	14.0-104			0.590	36.4
2,4-Dinitrotoluene	0.500	ND	0.423	0.424	84.6	84.8	1	16.2-135			0.210	20.6
Hexachlorobenzene	0.500	ND	0.429	0.422	85.7	84.4	1	31.9-135			1.52	20
Hexachloro-1,3-butadiene	0.500	ND	0.314	0.309	62.8	61.8	1	15.7-109			1.59	37.6
Hexachloroethane	0.500	ND	0.265	0.256	53.1	51.3	1	10.4-105			3.43	40
Nitrobenzene	0.500	ND	0.333	0.330	66.5	65.9	1	23.1-121			0.860	29
Pyridine	0.500	ND	0.147	0.157	29.5	31.3	1	10.0-77.8			5.99	38.8
2-Methylphenol	0.500	0.0153	0.319	0.313	60.8	59.6	1	10.0-133			1.88	40
3&4-Methyl Phenol	0.500	ND	0.341	0.341	68.2	68.3	1	17.4-100			0.0900	27.7
Pentachlorophenol	0.500	ND	0.482	0.454	96.4	90.8	1	10.0-108			5.93	40
2,4,5-Trichlorophenol	0.500	ND	0.447	0.408	89.3	81.6	1	30.6-120			9.08	33.8
2,4,6-Trichlorophenol	0.500	ND	0.431	0.401	86.1	80.2	1	19.1-114			7.14	29.9
(S) Nitrobenzene-d5					*70.0*	*64.1*		*21.8-123*				
(S) 2-Fluorobiphenyl					*74.9*	*75.4*		*29.5-131*				
(S) p-Terphenyl-d14					*80.0*	*79.1*		*29.3-137*				
(S) Phenol-d5					*39.2*	*39.8*		*5.00-70.1*				
(S) 2-Fluorophenol					*54.1*	*55.7*		*10.0-77.9*				
(S) 2,4,6-Tribromophenol					*99.2*	*92.7*		*11.2-130*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

Qualifier	Description
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

ACCREDITATIONS & LOCATIONS

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State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

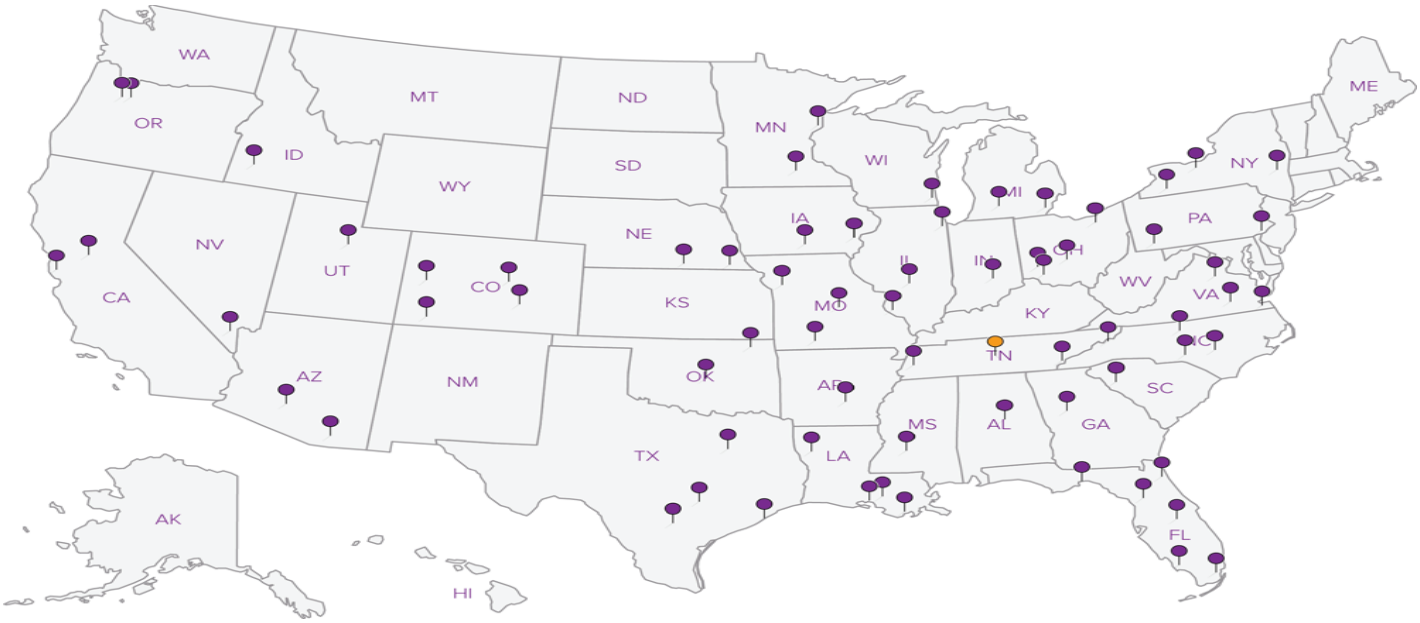
[1.] Drinking Water [2.] Underground Storage Tanks [3.] Aquatic Toxicity [4.] Chemical/Microbiological [5.] Mold [n/a] Accreditation not applicable

Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
Canada	1461.01	DOD	1461.01
EPA–Crypto	TN00003	USDA	S-67674

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



BAE Systems - Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, TN 37660

Billing Information:

Report to: [redacted]

Email to: [redacted]

Project Description: October Waste Oil T2

City/State Collected: Kingsport, TN

Phone: [redacted]
FAX:

Client Project #:

ESC Key:

Collected by: [redacted]

Site/Facility ID#:

P.O.#: JAE-080110-01

Collected by (signature):

Immediately Packed on Ice: N (Y)

Rush? (Lab MUST Be Notified)
____ Same Day..... 200%
____ Next Day..... 100%
____ Two Day..... 50%
____ Three Day..... 25%

Date Results Needed:

Email? __No_✓_Yes

FAX? __No__Yes

Analysis/Container/Preservative

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	TCLP metals	TCLP Organics	PCBs	Remarks/Contaminant	Sample # (lab only)
T2Used Oil Sample	Grab			10/5/15	1300	1	x	x	x		749656-21/a

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

pH _____ Temp _____

Remarks:

Flow _____ Other _____

Chain of Custody
Page 1 of 1

ESC LAB SCIENCES
12065 Lebanon Road
Mt. Juliet, TN 37122

Phone: (800) 767-5859
Phone: (615) 758-5858
Fax: (615) 758-5859

A105

CoCode (lab use only)

Template/Prelogin

Shipped Via:

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Rick Smith	10/5/15	1530	[signature]
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☑ FedEx ☐ Courier ☐ _____

Temp: 2.1c | Bottles Received: 1

Date: 10/6/15 | Time: 0900

Condition: (lab use only) TB11

CoC Seals Intact: ✓ Y ___ N ___ NA

pH Checked: | NCF: X

ESC Lab Sciences
Non-Conformance Form

Login #L792656	Client: BAESYSKTN	Date:10/06/15	Evaluated by:Matt S

Non-Conformance (check applicable items)

	Sample Integrity		Chain of Custody Clarification		
	Parameter(s) past holding time		Login Clarification Needed		**If Broken Container:**
	Improper temperature		Chain of custody is incomplete		Insufficient packing material around container
	Improper container type		Please specify Metals requested.		Insufficient packing material inside cooler
	Improper preservation		Please specify TCLP requested.		Improper handling by carrier (FedEx / UPS / Courier
	Insufficient sample volume.		Received additional samples not listed on coc.		Sample was frozen
	Sample is biphasic.		Sample ids on containers do not match ids on coc		Container lid not intact
	Vials received with headspace.		Trip Blank not received.		**If no Chain of Custody:**
	Broken container		Client did not "X" analysis.		Received by:
	Broken container:		Chain of Custody is missing		Date/Time:
	Sufficient sample remains				Temp./Cont. Rec./pH:
					Carrier:
					Tracking#

Login Comments: Please clarify what to run for TCLP Organics

Client informed by:		Call	x	Email		Voice Mail		Date: 10-7-15	Time: 12:15
TSR Initials: LC	Client Contact: Paul Bailey								

Login Instructions:

TCLP Volatiles and Semivolatiles only. No pest and herbs.

ESC LAB SCIENCES
YOUR LAB OF CHOICE

ANALYTICAL REPORT

January 27, 2016

myESC
REAL TIME DATA ACCESS

BAE Systems-Holston Army Ammunition

Sample Delivery Group:	L813225
Samples Received:	01/23/2016
Project Number:	
Description:	156 PCB Waste Oil Sample

Report To: [redacted]

4509 West Stone Drive

Kingsport, TN 37660

Entire Report Reviewed By:

Linda Cashman

Linda Cashman
Technical Service Representative

DRUM #1 L813225-01 Solid

Collected by: R Smith | Collected date/time: 01/20/16 12:14 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 10:03	LKD

DRUM #2 L813225-02 Solid

Collected by: R Smith | Collected date/time: 01/20/16 11:25 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 10:17	LKD

DRUM #3 L813225-03 Solid

Collected by: R Smith | Collected date/time: 01/20/16 11:35 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 10:31	LKD

DRUM #4 L813225-04 Solid

Collected by: R Smith | Collected date/time: 01/20/16 11:40 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 10:44	LKD

DRUM #5 L813225-05 Solid

Collected by: R Smith | Collected date/time: 01/20/16 11:45 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 10:58	LKD

DRUM #6 L813225-06 Solid

Collected by: R Smith | Collected date/time: 01/20/16 11:50 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 11:12	LKD

DRUM #7 L813225-07 Solid

Collected by: R Smith | Collected date/time: 01/20/16 11:55 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 11:26	LKD

DRUM #8 L813225-08 Solid

Collected by: R Smith | Collected date/time: 01/20/16 12:00 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 11:40	LKD
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	10	01/26/16 08:28	01/27/16 13:58	LKD

DRUM #9 L813225-09 Solid

Collected by: R Smith | Collected date/time: 01/20/16 12:07 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 11:54	LKD

DRUM #10 L813225-10 Solid

Collected by: R Smith | Collected date/time: 01/20/16 12:14 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 12:07	LKD

DRUM #11 L813225-11 Solid

Collected by: R Smith | Collected date/time: 01/20/16 12:20 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 12:21	LKD

DRUM #12 L813225-12 Solid

Collected by: R Smith | Collected date/time: 01/20/16 12:40 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 12:35	LKD

DRUM #13 L813225-13 Solid

Collected by: R Smith | Collected date/time: 01/20/16 12:33 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 12:49	LKD

DRUM #14 L813225-14 Solid

Collected by: R Smith | Collected date/time: 01/20/16 12:27 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 13:03	LKD

DRUM #15 L813225-15 Solid

Collected by: R Smith | Collected date/time: 01/20/16 11:47 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 13:17	LKD

DRUM #16 L813225-16 Solid

Collected by: R Smith | Collected date/time: 01/20/16 12:45 | Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 13:31	LKD

DRUM #17 L813225-17 Solid

Collected by: R Smith

Collected date/time: 01/20/16 12:50

Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844229	1	01/26/16 08:28	01/27/16 13:44	LKD

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

[Preliminary Report]

Linda Cashman
Technical Service Representative

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 10:03	WG844229
PCB 1221	ND		1.00	1	01/27/2016 10:03	WG844229
PCB 1232	ND		1.00	1	01/27/2016 10:03	WG844229
PCB 1242	ND		1.00	1	01/27/2016 10:03	WG844229
PCB 1248	ND		1.00	1	01/27/2016 10:03	WG844229
PCB 1254	ND		1.00	1	01/27/2016 10:03	WG844229
PCB 1260	ND		1.00	1	01/27/2016 10:03	WG844229
(S) Decachlorobiphenyl	*67.2*		*60.0-140*		*01/27/2016 10:03*	WG844229
(S) Tetrachloro-m-xylene	*111*		*60.0-140*		*01/27/2016 10:03*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 10:17	WG844229
PCB 1221	ND		1.00	1	01/27/2016 10:17	WG844229
PCB 1232	ND		1.00	1	01/27/2016 10:17	WG844229
PCB 1242	ND		1.00	1	01/27/2016 10:17	WG844229
PCB 1248	ND		1.00	1	01/27/2016 10:17	WG844229
PCB 1254	ND		1.00	1	01/27/2016 10:17	WG844229
PCB 1260	ND		1.00	1	01/27/2016 10:17	WG844229
(S) Decachlorobiphenyl	*79.7*		*60.0-140*		*01/27/2016 10:17*	WG844229
(S) Tetrachloro-m-xylene	*130*		*60.0-140*		*01/27/2016 10:17*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 10:31	WG844229
PCB 1221	ND		1.00	1	01/27/2016 10:31	WG844229
PCB 1232	ND		1.00	1	01/27/2016 10:31	WG844229
PCB 1242	ND		1.00	1	01/27/2016 10:31	WG844229
PCB 1248	ND		1.00	1	01/27/2016 10:31	WG844229
PCB 1254	ND		1.00	1	01/27/2016 10:31	WG844229
PCB 1260	ND		1.00	1	01/27/2016 10:31	WG844229
(S) Decachlorobiphenyl	*56.7*	J2	*60.0-140*		*01/27/2016 10:31*	WG844229
(S) Tetrachloro-m-xylene	*99.5*		*60.0-140*		*01/27/2016 10:31*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 10:44	WG844229
PCB 1221	ND		1.00	1	01/27/2016 10:44	WG844229
PCB 1232	ND		1.00	1	01/27/2016 10:44	WG844229
PCB 1242	ND		1.00	1	01/27/2016 10:44	WG844229
PCB 1248	ND		1.00	1	01/27/2016 10:44	WG844229
PCB 1254	ND		1.00	1	01/27/2016 10:44	WG844229
PCB 1260	ND		1.00	1	01/27/2016 10:44	WG844229
(S) Decachlorobiphenyl	*72.1*		*60.0-140*		*01/27/2016 10:44*	WG844229
(S) Tetrachloro-m-xylene	*112*		*60.0-140*		*01/27/2016 10:44*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 10:58	WG844229
PCB 1221	ND		1.00	1	01/27/2016 10:58	WG844229
PCB 1232	ND		1.00	1	01/27/2016 10:58	WG844229
PCB 1242	ND		1.00	1	01/27/2016 10:58	WG844229
PCB 1248	ND		1.00	1	01/27/2016 10:58	WG844229
PCB 1254	ND		1.00	1	01/27/2016 10:58	WG844229
PCB 1260	ND		1.00	1	01/27/2016 10:58	WG844229
(S) Decachlorobiphenyl	*46.8*	J2	*60.0-140*		*01/27/2016 10:58*	WG844229
(S) Tetrachloro-m-xylene	*121*		*60.0-140*		*01/27/2016 10:58*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 11:12	WG844229
PCB 1221	ND		1.00	1	01/27/2016 11:12	WG844229
PCB 1232	ND		1.00	1	01/27/2016 11:12	WG844229
PCB 1242	ND		1.00	1	01/27/2016 11:12	WG844229
PCB 1248	ND		1.00	1	01/27/2016 11:12	WG844229
PCB 1254	ND		1.00	1	01/27/2016 11:12	WG844229
PCB 1260	ND		1.00	1	01/27/2016 11:12	WG844229
(S) Decachlorobiphenyl	*49.9*	J2	*60.0-140*		*01/27/2016 11:12*	WG844229
(S) Tetrachloro-m-xylene	*87.3*		*60.0-140*		*01/27/2016 11:12*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 11:26	WG844229
PCB 1221	ND		1.00	1	01/27/2016 11:26	WG844229
PCB 1232	ND		1.00	1	01/27/2016 11:26	WG844229
PCB 1242	ND		1.00	1	01/27/2016 11:26	WG844229
PCB 1248	ND		1.00	1	01/27/2016 11:26	WG844229
PCB 1254	ND		1.00	1	01/27/2016 11:26	WG844229
PCB 1260	ND		1.00	1	01/27/2016 11:26	WG844229
(S) Decachlorobiphenyl	*59.5*	J2	*60.0-140*		*01/27/2016 11:26*	WG844229
(S) Tetrachloro-m-xylene	*122*		*60.0-140*		*01/27/2016 11:26*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 11:40	WG844229
PCB 1221	ND		1.00	1	01/27/2016 11:40	WG844229
PCB 1232	ND		1.00	1	01/27/2016 11:40	WG844229
PCB 1242	ND		1.00	1	01/27/2016 11:40	WG844229
PCB 1248	ND		1.00	1	01/27/2016 11:40	WG844229
PCB 1254	ND		1.00	1	01/27/2016 11:40	WG844229
PCB 1260	16.6		10.0	10	01/27/2016 13:58	WG844229
(S) Decachlorobiphenyl	*60.3*		*60.0-140*		*01/27/2016 11:40*	WG844229
(S) Tetrachloro-m-xylene	*102*		*60.0-140*		*01/27/2016 11:40*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 11:54	WG844229
PCB 1221	ND		1.00	1	01/27/2016 11:54	WG844229
PCB 1232	ND		1.00	1	01/27/2016 11:54	WG844229
PCB 1242	ND		1.00	1	01/27/2016 11:54	WG844229
PCB 1248	ND		1.00	1	01/27/2016 11:54	WG844229
PCB 1254	ND		1.00	1	01/27/2016 11:54	WG844229
PCB 1260	ND		1.00	1	01/27/2016 11:54	WG844229
(S) Decachlorobiphenyl	*51.4*	J2	*60.0-140*		*01/27/2016 11:54*	WG844229
(S) Tetrachloro-m-xylene	*101*		*60.0-140*		*01/27/2016 11:54*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 12:07	WG844229
PCB 1221	ND		1.00	1	01/27/2016 12:07	WG844229
PCB 1232	ND		1.00	1	01/27/2016 12:07	WG844229
PCB 1242	ND		1.00	1	01/27/2016 12:07	WG844229
PCB 1248	ND		1.00	1	01/27/2016 12:07	WG844229
PCB 1254	ND		1.00	1	01/27/2016 12:07	WG844229
PCB 1260	ND		1.00	1	01/27/2016 12:07	WG844229
(S) Decachlorobiphenyl	*46.7*	J2	*60.0-140*		*01/27/2016 12:07*	WG844229
(S) Tetrachloro-m-xylene	*100*		*60.0-140*		*01/27/2016 12:07*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 12:21	WG844229
PCB 1221	ND		1.00	1	01/27/2016 12:21	WG844229
PCB 1232	ND		1.00	1	01/27/2016 12:21	WG844229
PCB 1242	ND		1.00	1	01/27/2016 12:21	WG844229
PCB 1248	ND		1.00	1	01/27/2016 12:21	WG844229
PCB 1254	ND		1.00	1	01/27/2016 12:21	WG844229
PCB 1260	ND		1.00	1	01/27/2016 12:21	WG844229
(S) Decachlorobiphenyl	*46.3*	J2	*60.0-140*		*01/27/2016 12:21*	WG844229
(S) Tetrachloro-m-xylene	*102*		*60.0-140*		*01/27/2016 12:21*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 12:35	WG844229
PCB 1221	ND		1.00	1	01/27/2016 12:35	WG844229
PCB 1232	ND		1.00	1	01/27/2016 12:35	WG844229
PCB 1242	ND		1.00	1	01/27/2016 12:35	WG844229
PCB 1248	ND		1.00	1	01/27/2016 12:35	WG844229
PCB 1254	ND		1.00	1	01/27/2016 12:35	WG844229
PCB 1260	ND		1.00	1	01/27/2016 12:35	WG844229
(S) Decachlorobiphenyl	*51.5*	J2	*60.0-140*		*01/27/2016 12:35*	WG844229
(S) Tetrachloro-m-xylene	*110*		*60.0-140*		*01/27/2016 12:35*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 12:49	WG844229
PCB 1221	ND		1.00	1	01/27/2016 12:49	WG844229
PCB 1232	ND		1.00	1	01/27/2016 12:49	WG844229
PCB 1242	ND		1.00	1	01/27/2016 12:49	WG844229
PCB 1248	ND		1.00	1	01/27/2016 12:49	WG844229
PCB 1254	ND		1.00	1	01/27/2016 12:49	WG844229
PCB 1260	ND		1.00	1	01/27/2016 12:49	WG844229
(S) Decachlorobiphenyl	*50.7*	J2	*60.0-140*		*01/27/2016 12:49*	WG844229
(S) Tetrachloro-m-xylene	*104*		*60.0-140*		*01/27/2016 12:49*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 13:03	WG844229
PCB 1221	ND		1.00	1	01/27/2016 13:03	WG844229
PCB 1232	ND		1.00	1	01/27/2016 13:03	WG844229
PCB 1242	ND		1.00	1	01/27/2016 13:03	WG844229
PCB 1248	ND		1.00	1	01/27/2016 13:03	WG844229
PCB 1254	ND		1.00	1	01/27/2016 13:03	WG844229
PCB 1260	ND		1.00	1	01/27/2016 13:03	WG844229
(S) Decachlorobiphenyl	*47.5*	J2	*60.0-140*		*01/27/2016 13:03*	WG844229
(S) Tetrachloro-m-xylene	*100*		*60.0-140*		*01/27/2016 13:03*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 13:17	WG844229
PCB 1221	ND		1.00	1	01/27/2016 13:17	WG844229
PCB 1232	ND		1.00	1	01/27/2016 13:17	WG844229
PCB 1242	ND		1.00	1	01/27/2016 13:17	WG844229
PCB 1248	ND		1.00	1	01/27/2016 13:17	WG844229
PCB 1254	ND		1.00	1	01/27/2016 13:17	WG844229
PCB 1260	ND		1.00	1	01/27/2016 13:17	WG844229
(S) Decachlorobiphenyl	*48.6*	J2	*60.0-140*		*01/27/2016 13:17*	WG844229
(S) Tetrachloro-m-xylene	*96.2*		*60.0-140*		*01/27/2016 13:17*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 13:31	WG844229
PCB 1221	ND		1.00	1	01/27/2016 13:31	WG844229
PCB 1232	ND		1.00	1	01/27/2016 13:31	WG844229
PCB 1242	ND		1.00	1	01/27/2016 13:31	WG844229
PCB 1248	ND		1.00	1	01/27/2016 13:31	WG844229
PCB 1254	ND		1.00	1	01/27/2016 13:31	WG844229
PCB 1260	ND		1.00	1	01/27/2016 13:31	WG844229
(S) Decachlorobiphenyl	*52.9*	J2	*60.0-140*		*01/27/2016 13:31*	WG844229
(S) Tetrachloro-m-xylene	*117*		*60.0-140*		*01/27/2016 13:31*	WG844229

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 13:44	WG844229
PCB 1221	ND		1.00	1	01/27/2016 13:44	WG844229
PCB 1232	ND		1.00	1	01/27/2016 13:44	WG844229
PCB 1242	ND		1.00	1	01/27/2016 13:44	WG844229
PCB 1248	ND		1.00	1	01/27/2016 13:44	WG844229
PCB 1254	ND		1.00	1	01/27/2016 13:44	WG844229
PCB 1260	ND		1.00	1	01/27/2016 13:44	WG844229
(S) Decachlorobiphenyl	*116*		*60.0-140*		*01/27/2016 13:44*	WG844229
(S) Tetrachloro-m-xylene	*108*		*60.0-140*		*01/27/2016 13:44*	WG844229

Method Blank (MB)

(MB) 01/27/16 09:18

Analyte	MB Result mg/kg	MB Qualifier	MB RDL mg/kg
PCB 1260	ND		1.00
PCB 1016	ND		1.00
PCB 1221	ND		1.00
PCB 1232	ND		1.00
PCB 1242	ND		1.00
PCB 1248	ND		1.00
PCB 1254	ND		1.00
(S) Decachlorobiphenyl	*109*		*60.0-140*
(S) Tetrachloro-m-xylene	*120*		*60.0-140*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 01/27/16 09:35 • (LCSD) 01/27/16 09:49

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
PCB 1260	0.500	0.582	0.647	116	129	60.0-140			10.5	20
PCB 1016	0.500	0.538	0.614	108	123	60.0-140			13.3	20
(S) Decachlorobiphenyl				*108*	*113*	*60.0-140*				
(S) Tetrachloro-m-xylene				*119*	*129*	*60.0-140*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

Qualifier	Description
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE.**

***** Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

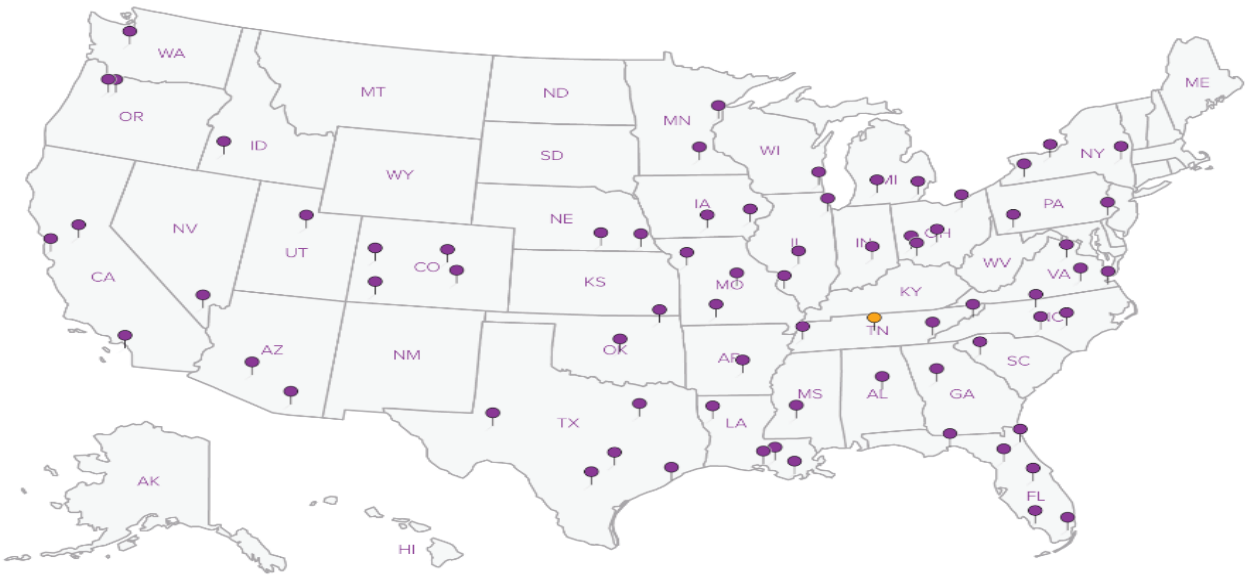
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

[1.] Drinking Water [2.] Underground Storage Tanks [3.] Aquatic Toxicity [4.] Chemical/Microbiological [5.] Mold [n/a] Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



BAE Systems - Holston
Army Ammunition Plant
4509 West Stone Drive
Kingsport, TN 37660

Billing Information:

Report to: [redacted]

Email to: [redacted]

Analysis/Container/Preservative

Chain of Custody
Page 1 of 1

ESC LABORATORIES
12065 Lebanon Road
Mt. Juliet, TN 37122
Phone (800) 767-5859
Phone (615) 758-5858
Fax (615) 758-5859

A121

Project Description:	156 PCB Waste Oil Sample	City/State Collected:	Kingsport, TN
Phone: [redacted] FAX:	Client Project #:	ESC Key:	
Collected by: [redacted] RSmith	Site/Facility ID#:	P.O.#:	JAE-080110-01

Collected by (signature): Rick Smith

Immediately Packed on Ice N (Y)

Rush? (Lab MUST Be Notified)
____ Same Day..... 200%
____ Next Day..... 100%
____ Two Day..... 50%
X Three Day..... 25%

Date Results Needed:
Email? __No_✓_Yes
FAX? __No__Yes

CoCode (lab use only)
Template/Prelogin
Shipped Via: LBI3225

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	PCB Method 8082	Remarks/Contaminant	Sample # (lab only)
DRUM #1	Grab			1-20-16	1115	1	x		-01
DRUM #2	GRAB			1-20-16	1125	1	X		-02
DRUM #3	GRAB			1-20-16	1135	1	X		-03
DRUM #4	GRAB			1-20-16	1140	1	X		-04
DRUM #5	GRAB			1-20-16	1145	1	X		-05
DRUM #6	GRAB			1-20-16	1150	1	X		-06
DRUM #7	GRAB			1-20-16	1155	1	X		-07
DRUM #8	GRAB			1-20-16	1200	1	X		-08
DRUM #9	GRAB			1-20-16	1207	1	X		-09

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

pH _____ Temp _____

Remarks:

Flow _____ Other _____

Relinquished by: (Signature) Rick Smith	Date: 1-21-16	Time: 1300	Received by: (Signature) CS Burnett	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐	Condition:	(lab use only) OK
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.3	Bottles Received: 19	CoC Seals Intact: ___ Y ___ N ___ NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) Gary Keam	Date: 1-23-16	Time: 1000	pH Checked: NCF:

BAE Systems - Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, TN 37660

Billing Information:

Report to: [redacted]

Email to: [redacted]

Project Description: 156 PCB Waste Oil Sample

City/State Collected: Kingsport, TN

Phone: [redacted]
FAX:

Client Project #:

ESC Key:

Collected by: ~~Paul Bailey~~ RSmith

Site/Facility ID#:

P.O.#: JAE-080110-01

Collected by (signature): Rick Smith

Immediately Packed on Ice: N (Y)

Rush? (Lab MUST Be Notified)
____ Same Day.....200%
____ Next Day.....100%
____ Two Day.....50%
X Three Day.....25%

Date Results Needed:

Email? __No ✓Yes

FAX? __No __Yes

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	PCB Method 8082	Remarks/Contaminant	Sample # (lab only)
DRUM #10	Grab			1-20-16	1214	1	x		-10 ~~-01~~
DRUM #11	GRAB			1-20-16	1220	1	X		-11 ~~-02~~
DRUM #[redacted]13	GRAB			1-20-16	1240	1	X		-13 ~~-03~~
DRUM #[redacted]14	GRAB			1-20-16	1233	1	X		-13 ~~-04~~
DRUM #[redacted]15	GRAB			1-20-16	1227	1	X		-14 ~~-05~~
DRUM # 16	GRAB			1-20-16	1147	1	X		-15 ~~-06~~
DRUM # 17	GRAB			1-20-16	1245	1	X		-16 ~~-07~~
DRUM # 19	GRAB			1-20-16	1250	1	X		-17 ~~-08~~

Analysis/Container/Preservative

Chain of Custody Page 1 of 1

ESC LABORATORIES
12065 Lebanon Road
Mt. Juliet, TN 37122
Phone (800) 767-5859
Phone (615) 758-5858
Fax (615) 758-5859

1/23/225

CoCode (lab use only)

Template/Prelogin

Shipped Via:

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

pH _____ Temp _____

Remarks:

Flow _____ Other _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐	Condition: (lab use only)
Rick Smith	1-21-16	1300	[signature]		OK
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.3 / Bottles Received: 17	COC Seals Intact: ___Y ___N ___NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 1-23-16 / Time: 1000	pH Checked: / NCF:

ESC LAB SCIENCES
YOUR LAB OF CHOICE

ANALYTICAL REPORT

January 27, 2016

myESC
REAL TIME DATA ACCESS

BAE Systems-Holston Army Ammunition

Sample Delivery Group:	L813226
Samples Received:	01/23/2016
Project Number:	
Description:	T-2 PCB Waste Oil Sample

Report To: [redacted]

4509 West Stone Drive

Kingsport, TN 37660

Entire Report Reviewed By:

Linda Cashman

Linda Cashman
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

DRUM #1 L813226-01 Solid

Collected by: R Smith
Collected date/time: 01/20/16 08:50
Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844418	1	01/26/16 11:11	01/27/16 11:00	LKD

DRUM #2 L813226-02 Solid

Collected by: R Smith
Collected date/time: 01/20/16 09:00
Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844418	1	01/26/16 11:11	01/27/16 11:17	LKD

DRUM #3 L813226-03 Solid

Collected by: R Smith
Collected date/time: 01/20/16 09:20
Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844418	1	01/26/16 11:11	01/27/16 11:33	LKD

DRUM #4 L813226-04 Solid

Collected by: R Smith
Collected date/time: 01/20/16 09:30
Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG844418	1	01/26/16 11:11	01/27/16 11:49	LKD

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

[Preliminary Report]

Linda Cashman
Technical Service Representative

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 11:00	WG844418
PCB 1221	ND		1.00	1	01/27/2016 11:00	WG844418
PCB 1232	ND		1.00	1	01/27/2016 11:00	WG844418
PCB 1242	ND		1.00	1	01/27/2016 11:00	WG844418
PCB 1248	ND		1.00	1	01/27/2016 11:00	WG844418
PCB 1254	ND		1.00	1	01/27/2016 11:00	WG844418
PCB 1260	ND		1.00	1	01/27/2016 11:00	WG844418
(S) Decachlorobiphenyl	*97.8*		*60.0-140*		*01/27/2016 11:00*	WG844418
(S) Tetrachloro-m-xylene	*123*		*60.0-140*		*01/27/2016 11:00*	WG844418

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 11:17	WG844418
PCB 1221	ND		1.00	1	01/27/2016 11:17	WG844418
PCB 1232	ND		1.00	1	01/27/2016 11:17	WG844418
PCB 1242	ND		1.00	1	01/27/2016 11:17	WG844418
PCB 1248	ND		1.00	1	01/27/2016 11:17	WG844418
PCB 1254	ND		1.00	1	01/27/2016 11:17	WG844418
PCB 1260	ND		1.00	1	01/27/2016 11:17	WG844418
(S) Decachlorobiphenyl	*96.3*		*60.0-140*		*01/27/2016 11:17*	WG844418
(S) Tetrachloro-m-xylene	*127*		*60.0-140*		*01/27/2016 11:17*	WG844418

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 11:33	WG844418
PCB 1221	ND		1.00	1	01/27/2016 11:33	WG844418
PCB 1232	ND		1.00	1	01/27/2016 11:33	WG844418
PCB 1242	ND		1.00	1	01/27/2016 11:33	WG844418
PCB 1248	ND		1.00	1	01/27/2016 11:33	WG844418
PCB 1254	ND		1.00	1	01/27/2016 11:33	WG844418
PCB 1260	ND		1.00	1	01/27/2016 11:33	WG844418
(S) Decachlorobiphenyl	*139*		*60.0-140*		*01/27/2016 11:33*	WG844418
(S) Tetrachloro-m-xylene	*56.3*	J2	*60.0-140*		*01/27/2016 11:33*	WG844418

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1016	ND		1.00	1	01/27/2016 11:49	WG844418
PCB 1221	ND		1.00	1	01/27/2016 11:49	WG844418
PCB 1232	ND		1.00	1	01/27/2016 11:49	WG844418
PCB 1242	ND		1.00	1	01/27/2016 11:49	WG844418
PCB 1248	ND		1.00	1	01/27/2016 11:49	WG844418
PCB 1254	ND		1.00	1	01/27/2016 11:49	WG844418
PCB 1260	ND		1.00	1	01/27/2016 11:49	WG844418
(S) Decachlorobiphenyl	*92.0*		*60.0-140*		*01/27/2016 11:49*	WG844418
(S) Tetrachloro-m-xylene	*75.3*		*60.0-140*		*01/27/2016 11:49*	WG844418

Method Blank (MB)

(MB) 01/27/16 09:55

Analyte	MB Result	MB Qualifier	MB RDL
	mg/kg		mg/kg
PCB 1260	ND		1.00
PCB 1016	ND		1.00
PCB 1221	ND		1.00
PCB 1232	ND		1.00
PCB 1242	ND		1.00
PCB 1248	ND		1.00
PCB 1254	ND		1.00
(S) Decachlorobiphenyl	*100*		*60.0-140*
(S) Tetrachloro-m-xylene	*93.4*		*60.0-140*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 01/27/16 10:11 • (LCSD) 01/27/16 10:28

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
PCB 1260	0.500	0.471	0.466	94.3	93.3	60.0-140			1.11	20
PCB 1016	0.500	0.446	0.461	89.2	92.2	60.0-140			3.33	20
(S) Decachlorobiphenyl				*103*	*102*	*60.0-140*				
(S) Tetrachloro-m-xylene				*95.4*	*95.7*	*60.0-140*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

Qualifier	Description
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE.**

***** Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

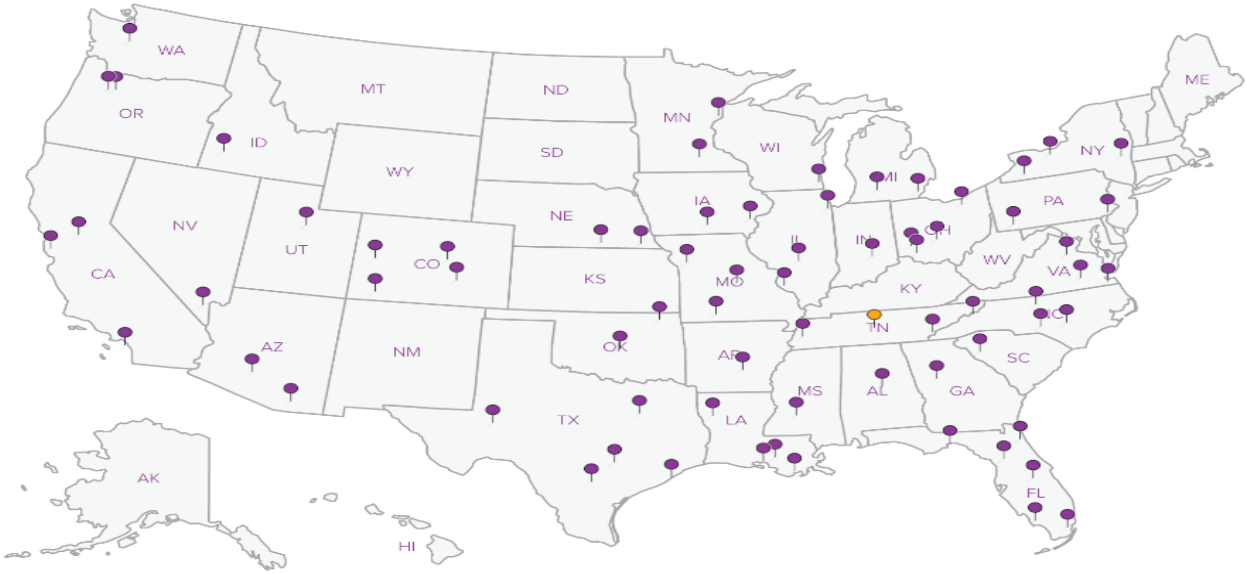
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

[1.] Drinking Water [2.] Underground Storage Tanks [3.] Aquatic Toxicity [4.] Chemical/Microbiological [5.] Mold [n/a] Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



BAE Systems - Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, TN 37660

Billing Information:

Report to: [redacted]

Email to: [redacted]

Project Description: T-2 PCB Waste Oil Sample

City/State Collected: Kingsport, TN

Phone: [redacted]
FAX:

Client Project #:

ESC Key:

Collected by: [redacted] RSmith

Site/Facility ID#:

P.O.#: JAE-080110-01

Collected by (signature): Rick Smith

Immediately Packed on Ice N (Y)

Rush? (Lab MUST Be Notified)
___ Same Day.....200%
___ Next Day.....100%
___ Two Day.....50%
X Three Day.....25%

Date Results Needed:
Email? __No ✓Yes
FAX? __No __Yes

Analysis/Container/Preservative

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	PCB Method 8082	Remarks/Contaminant	Sample # (lab only)
Drum #1	Grab			1-20-16	0850	1	x		-01
Drum #2	Grab			1-20-16	0900	1	x		-02
Drum #3	Grab			1-20-16	0920	1	x		-03
Drum #4	Grab			1-20-16	0930	1	x		-04

Chain of Custody Page 1 of 1

ESC LABORATORIES
12065 Lebanon Road
Mt. Juliet, TN 37122
Phone (800) 767-5859
Phone (615) 758-5858
Fax (615) 758-5859

A120

CoCode (lab use only)
Template/Prelogin
Shipped Via: UPS 226

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐	Condition: (lab use only)
Rick Smith	1-21-16	1300	[signature]		OK
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.3 / Bottles Received: 4 QQ	CoC Seals Intact: ___Y ___N ___NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 1-23-16 / Time: 1000	pH Checked: / NCF:

ESC LAB SCIENCES
YOUR LAB OF CHOICE

ANALYTICAL REPORT

January 27, 2016

myESC
REAL TIME DATA ACCESS

BAE Systems-Holston Army Ammunition

Sample Delivery Group:	L813227
Samples Received:	01/23/2016
Project Number:	
Description:	January Waste Oil Sample

Report To: [redacted]

4509 West Stone Drive

Kingsport, TN 37660

Entire Report Reviewed By:

Linda Cashman

Linda Cashman
Technical Service Representative

COMPOSITE WASTE OIL SAMPLE AT T-2/156 L813227-01 Waste

Collected by: R Smith
Collected date/time: 01/20/16 11:00
Received date/time: 01/23/16 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG844617	1	01/26/16 12:40	01/27/16 09:51	BRJ
Metals (ICP) by Method 6010B	WG844627	1	01/26/16 10:40	01/26/16 16:35	WBD
Preparation by Method 1311	WG844237	1	01/25/16 12:36	01/25/16 12:37	CHM
Preparation by Method 1311	WG844270	1	01/25/16 08:29	01/26/16 07:53	CHM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG844733	1	01/26/16 15:46	01/27/16 07:14	JF
Volatile Organic Compounds (GC/MS) by Method 8260B	WG844548	1	01/26/16 13:16	01/26/16 13:16	BMB

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

[Preliminary Report]

Linda Cashman
Technical Service Representative

Preparation by Method 1311

Analyte	Result	Qualifier	Prep date / time	Batch
TCLP Extraction	-		1/25/2016 12:36:12 PM	WG844237
TCLP ZHE Extraction	-		1/25/2016 8:29:19 AM	WG844270

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.0100	0.20	1	01/27/2016 09:51	WG844617

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.450	5	1	01/26/2016 16:35	WG844627
Barium	ND		1.35	100	1	01/26/2016 16:35	WG844627
Cadmium	ND		0.450	1	1	01/26/2016 16:35	WG844627
Chromium	ND		0.450	5	1	01/26/2016 16:35	WG844627
Lead	ND		0.450	5	1	01/26/2016 16:35	WG844627
Selenium	ND		0.450	1	1	01/26/2016 16:35	WG844627
Silver	ND		0.450	5	1	01/26/2016 16:35	WG844627

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.0500	0.50	1	01/26/2016 13:16	WG844548
Carbon tetrachloride	ND		0.0500	0.50	1	01/26/2016 13:16	WG844548
Chlorobenzene	ND		0.0500	100	1	01/26/2016 13:16	WG844548
Chloroform	ND		0.250	6	1	01/26/2016 13:16	WG844548
1,2-Dichloroethane	ND		0.0500	0.50	1	01/26/2016 13:16	WG844548
1,1-Dichloroethene	ND		0.0500	0.70	1	01/26/2016 13:16	WG844548
2-Butanone (MEK)	ND		0.500	200	1	01/26/2016 13:16	WG844548
Tetrachloroethene	ND		0.0500	0.70	1	01/26/2016 13:16	WG844548
Trichloroethene	ND		0.0500	0.50	1	01/26/2016 13:16	WG844548
Vinyl chloride	ND		0.0500	0.20	1	01/26/2016 13:16	WG844548
(S) Toluene-d8	*104*		*90.0-115*	*114*		*01/26/2016 13:16*	WG844548
(S) Dibromofluoromethane	*97.5*		*79.0-121*	*125*		*01/26/2016 13:16*	WG844548
(S) a,a,a-Trifluorotoluene	*108*		*90.4-116*	*114*		*01/26/2016 13:16*	WG844548
(S) 4-Bromofluorobenzene	*106*		*80.1-120*	*128*		*01/26/2016 13:16*	WG844548

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
1,4-Dichlorobenzene	ND		0.100	7.50	1	01/27/2016 07:14	WG844733
2,4-Dinitrotoluene	ND		0.100	0.13	1	01/27/2016 07:14	WG844733
Hexachlorobenzene	ND		0.100	0.13	1	01/27/2016 07:14	WG844733
Hexachloro-1,3-butadiene	ND		0.100	0.50	1	01/27/2016 07:14	WG844733
Hexachloroethane	ND		0.100	3	1	01/27/2016 07:14	WG844733
Nitrobenzene	ND		0.100	2	1	01/27/2016 07:14	WG844733
Pyridine	ND		0.100	5	1	01/27/2016 07:14	WG844733
3&4-Methyl Phenol	ND		0.100	400	1	01/27/2016 07:14	WG844733
2-Methylphenol	ND		0.100	200	1	01/27/2016 07:14	WG844733
Pentachlorophenol	ND		0.100	100	1	01/27/2016 07:14	WG844733
2,4,5-Trichlorophenol	ND		0.100	400	1	01/27/2016 07:14	WG844733
2,4,6-Trichlorophenol	ND		0.100	2	1	01/27/2016 07:14	WG844733
(S) 2-Fluorophenol	*44.0*		*10.0-77.9*	*87*		*01/27/2016 07:14*	WG844733
(S) Phenol-d5	*31.3*		*5.00-70.1*	*67*		*01/27/2016 07:14*	WG844733

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
(S) Nitrobenzene-d5	*68.1*		*21.8-123*	*120*		*01/27/2016 07:14*	WG844733
(S) 2-Fluorobiphenyl	*77.1*		*29.5-131*	*122*		*01/27/2016 07:14*	WG844733
(S) 2,4,6-Tribromophenol	*76.7*		*11.2-130*	*148*		*01/27/2016 07:14*	WG844733
(S) p-Terphenyl-d14	*88.4*		*29.3-137*	*149*		*01/27/2016 07:14*	WG844733

Method Blank (MB)

(MB) 01/27/16 09:13

Analyte	MB Result	MB Qualifier	MB RDL
	mg/l		mg/l
Mercury	ND		0.0100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 01/27/16 09:16 • (LCSD) 01/27/16 09:18

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Mercury	0.0300	0.0312	0.0314	104	105	80-120			0	20

L813255-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 01/27/16 09:21 • (MS) 01/27/16 09:23 • (MSD) 01/27/16 09:26

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.0300	0.0000810	0.0262	0.0318	87	106	1	75-125			19	20

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) 01/26/16 15:43

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Arsenic	ND		0.450
Barium	ND		1.35
Cadmium	ND		0.450
Chromium	ND		0.450
Lead	ND		0.450
Selenium	ND		0.450
Silver	ND		0.450

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 01/26/16 15:46 • (LCSD) 01/26/16 15:49

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	10.0	9.46	9.46	95	95	80-120			0	20
Barium	10.0	9.27	9.26	93	93	80-120			0	20
Cadmium	10.0	9.33	9.30	93	93	80-120			0	20
Chromium	10.0	9.38	9.30	94	93	80-120			1	20
Lead	10.0	9.30	9.24	93	92	80-120			1	20
Selenium	10.0	9.45	9.48	94	95	80-120			0	20
Silver	10.0	9.24	9.17	92	92	80-120			1	20

L813012-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 01/26/16 15:52 • (MS) 01/26/16 15:58 • (MSD) 01/26/16 16:01

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	10.0	0.0265	9.82	9.86	98	98	1	75-125			0	20
Barium	10.0	0.587	9.74	9.72	92	91	1	75-125			0	20
Cadmium	10.0	0.0000246	9.51	9.50	95	95	1	75-125			0	20
Chromium	10.0	0.00168	9.33	9.38	93	94	1	75-125			0	20
Lead	10.0	0.0105	9.41	9.37	94	94	1	75-125			0	20
Selenium	10.0	0.0467	9.99	10.0	99	100	1	75-125			0	20
Silver	10.0	0.00214	9.41	9.46	94	95	1	75-125			1	20

Method Blank (MB)

(MB) 01/26/16 10:07

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
Benzene	ND		0.0500
Carbon tetrachloride	ND		0.0500
Chlorobenzene	ND		0.0500
Chloroform	ND		0.250
1,2-Dichloroethane	ND		0.0500
1,1-Dichloroethene	ND		0.0500
2-Butanone (MEK)	ND		0.500
Tetrachloroethene	ND		0.0500
Trichloroethene	ND		0.0500
Vinyl chloride	ND		0.0500
(S) Toluene-d8	*105*		*90.0-115*
(S) Dibromofluoromethane	*100*		*79.0-121*
(S) a,a,a-Trifluorotoluene	*108*		*90.4-116*
(S) 4-Bromofluorobenzene	*106*		*80.1-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 01/26/16 06:16 • (LCSD) 01/26/16 06:37

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0266	0.0277	106	111	73.0-122			4.07	20
Carbon tetrachloride	0.0250	0.0242	0.0250	96.7	100	70.9-129			3.55	20
Chlorobenzene	0.0250	0.0244	0.0256	97.5	102	79.7-122			4.95	20
Chloroform	0.0250	0.0279	0.0289	111	116	73.2-125			3.76	20
1,2-Dichloroethane	0.0250	0.0267	0.0276	107	110	65.3-126			3.44	20
1,1-Dichloroethene	0.0250	0.0246	0.0256	98.4	102	60.6-133			3.85	20
2-Butanone (MEK)	0.125	0.147	0.144	117	115	46.4-155			1.76	20
Tetrachloroethene	0.0250	0.0240	0.0253	96.0	101	73.5-130			5.48	20
Trichloroethene	0.0250	0.0259	0.0268	104	107	79.5-121			3.27	20
Vinyl chloride	0.0250	0.0275	0.0279	110	112	61.5-134			1.42	20
(S) Toluene-d8				*104*	*102*	*90.0-115*				
(S) Dibromofluoromethane				*101*	*100*	*79.0-121*				
(S) a,a,a-Trifluorotoluene				*106*	*104*	*90.4-116*				
(S) 4-Bromofluorobenzene				*105*	*104*	*80.1-120*				

L813011-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 01/26/16 11:10 • (MS) 01/26/16 11:31 • (MSD) 01/26/16 11:52

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	1.25	ND	1.34	1.20	107	95.9	1	58.6-133			11.3	20
Carbon tetrachloride	1.25	ND	1.26	1.09	101	87.5	1	60.6-139			14.0	20
Chlorobenzene	1.25	ND	1.29	1.12	103	89.7	1	70.1-130			13.7	20
Chloroform	1.25	ND	1.41	1.25	113	99.9	1	66.1-133			11.9	20
1,2-Dichloroethane	1.25	ND	1.32	1.17	105	93.3	1	60.7-132			12.0	20
1,1-Dichloroethene	1.25	ND	1.27	1.13	102	90.8	1	48.8-144			11.3	20
2-Butanone (MEK)	6.25	ND	4.68	4.11	74.9	65.7	1	45.0-156			13.1	20.8
Tetrachloroethene	1.25	ND	1.28	1.12	102	89.9	1	57.4-141			12.7	20
Trichloroethene	1.25	ND	1.33	1.18	106	94.2	1	48.9-148			11.9	20
Vinyl chloride	1.25	ND	1.39	1.24	111	99.2	1	44.3-143			11.7	20
(S) Toluene-d8					*103*	*103*		*90.0-115*				
(S) Dibromofluoromethane					*98.5*	*97.3*		*79.0-121*				
(S) a,a,a-Trifluorotoluene					*107*	*106*		*90.4-116*				
(S) 4-Bromofluorobenzene					*104*	*103*		*80.1-120*				

Method Blank (MB)

(MB) 01/27/16 04:07

Analyte	MB Result mg/l	MB Qualifier	MB RDL mg/l
1,4-Dichlorobenzene	ND		0.100
2,4-Dinitrotoluene	ND		0.100
Hexachlorobenzene	ND		0.100
Hexachloro-1,3-butadiene	ND		0.100
Hexachloroethane	ND		0.100
Nitrobenzene	ND		0.100
Pyridine	ND		0.100
2-Methylphenol	ND		0.100
3&4-Methyl Phenol	ND		0.100
Pentachlorophenol	ND		0.100
2,4,5-Trichlorophenol	ND		0.100
2,4,6-Trichlorophenol	ND		0.100
(S) Nitrobenzene-d5	*57.0*		*21.8-123*
(S) 2-Fluorobiphenyl	*67.1*		*29.5-131*
(S) p-Terphenyl-d14	*76.5*		*29.3-137*
(S) Phenol-d5	*21.2*		*5.00-70.1*
(S) 2-Fluorophenol	*35.3*		*10.0-77.9*
(S) 2,4,6-Tribromophenol	*65.7*		*11.2-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 01/27/16 02:33 • (LCSD) 01/27/16 03:20

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,4-Dichlorobenzene	0.0500	ND	ND	56.2	55.3	21.0-89.4			1.72	32.6
2,4-Dinitrotoluene	0.0500	0.0426	0.0416	85.1	83.2	31.2-105			2.23	22
Hexachlorobenzene	0.0500	0.0405	0.0396	81.0	79.2	38.5-116			2.32	20.1
Hexachloro-1,3-butadiene	0.0500	ND	ND	58.1	55.8	16.1-104			4.05	31.2
Hexachloroethane	0.0500	ND	ND	57.5	58.1	16.5-89.8			1.09	30.7
Nitrobenzene	0.0500	0.0345	0.0347	69.1	69.4	31.4-106			0.460	25.7
Pyridine	0.0500	ND	ND	38.9	38.9	13.5-58.9			0.160	32.5
2-Methylphenol	0.0500	ND	ND	54.5	56.6	26.4-86.9			3.69	26.5
3&4-Methyl Phenol	0.0500	ND	ND	58.3	60.5	27.9-92.0			3.65	27
Pentachlorophenol	0.0500	ND	ND	59.3	44.1	10.0-97.4			29.5	35.1
2,4,5-Trichlorophenol	0.0500	0.0410	0.0392	81.9	78.5	34.9-112			4.36	23.9
2,4,6-Trichlorophenol	0.0500	0.0390	0.0376	78.1	75.2	29.8-107			3.75	24.1

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 01/27/16 02:33 • (LCSD) 01/27/16 03:20

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) Nitrobenzene-d5				*65.4*	*64.5*	*21.8-123*				
(S) 2-Fluorobiphenyl				*68.5*	*70.7*	*29.5-131*				
(S) p-Terphenyl-d14				*81.0*	*78.5*	*29.3-137*				
(S) Phenol-d5				*28.2*	*28.8*	*5.00-70.1*				
(S) 2-Fluorophenol				*40.8*	*43.2*	*10.0-77.9*				
(S) 2,4,6-Tribromophenol				*78.2*	*74.7*	*11.2-130*				

L813011-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 01/27/16 06:04 • (MS) 01/27/16 06:27 • (MSD) 01/27/16 06:50

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
1,4-Dichlorobenzene	0.500	ND	0.300	0.295	59.9	59.1	1	14.0-104			1.44	36.4
2,4-Dinitrotoluene	0.500	ND	0.426	0.434	85.2	86.8	1	16.2-135			1.93	20.6
Hexachlorobenzene	0.500	ND	0.413	0.406	82.6	81.1	1	31.9-135			1.76	20
Hexachloro-1,3-butadiene	0.500	ND	0.314	0.299	62.8	59.8	1	15.7-109			4.88	37.6
Hexachloroethane	0.500	ND	0.304	0.298	60.7	59.7	1	10.4-105			1.75	40
Nitrobenzene	0.500	ND	0.361	0.364	72.1	72.7	1	23.1-121			0.790	29
Pyridine	0.500	ND	0.196	0.204	39.2	40.7	1	10.0-77.8			3.77	38.8
2-Methylphenol	0.500	ND	0.260	0.255	51.9	51.1	1	10.0-133			1.72	40
3&4-Methyl Phenol	0.500	ND	0.270	0.265	54.0	53.0	1	17.4-100			1.81	27.7
Pentachlorophenol	0.500	ND	0.437	0.420	87.4	84.0	1	10.0-108			3.97	40
2,4,5-Trichlorophenol	0.500	ND	0.423	0.418	84.6	83.7	1	30.6-120			1.16	33.8
2,4,6-Trichlorophenol	0.500	ND	0.410	0.398	82.0	79.5	1	19.1-114			3.07	29.9
(S) Nitrobenzene-d5					*67.6*	*68.4*		*21.8-123*				
(S) 2-Fluorobiphenyl					*75.3*	*76.5*		*29.5-131*				
(S) p-Terphenyl-d14					*81.8*	*80.0*		*29.3-137*				
(S) Phenol-d5					*25.2*	*23.8*		*5.00-70.1*				
(S) 2-Fluorophenol					*37.7*	*35.6*		*10.0-77.9*				
(S) 2,4,6-Tribromophenol					*84.9*	*80.7*		*11.2-130*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

Qualifier	Description
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE.**

***** Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

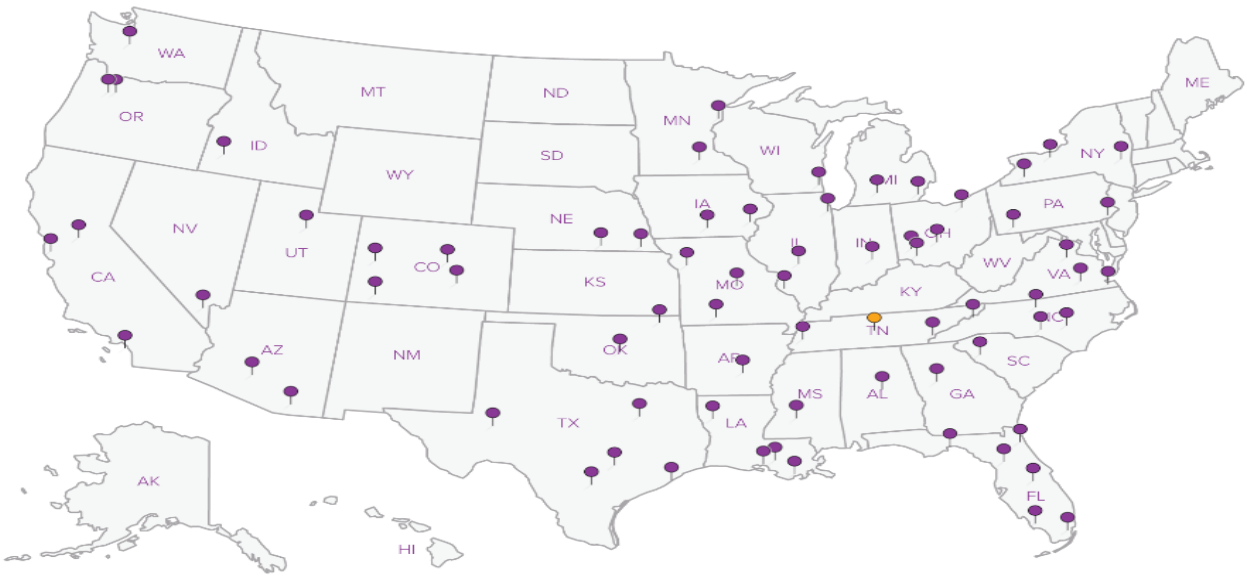
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

[1.] Drinking Water [2.] Underground Storage Tanks [3.] Aquatic Toxicity [4.] Chemical/Microbiological [5.] Mold [n/a] Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



BAE Systems - Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, TN 37660

Billing Information:

Report to: [redacted]

Email to: [redacted]

Analysis/Container/Preservative

Chain of Custody
Page 1 of 1

ESC LABORATORIES
12065 Lebanon Road
Mt. Juliet, TN 37122
Phone (800) 767-5859
Phone (615) 758-5858
Fax (615) 758-5859

A122

Project Description:	January Waste Oil Sample	City/State Collected	Kingsport, TN
Phone: [redacted] FAX:	Client Project #:	ESC Key:	
Collected by: R Smith	Site/Facility ID#:	P.O.#:	JAE-080110-01

Collected by (signature): Rick Smith

Immediately Packed on Ice: N ___ Y ___

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
X Three Day 25%

Date Results Needed:

Email? __No ✓Yes

FAX? __No __Yes

CoCode (lab use only)

Template/Prelogin

Shipped Via: LBB27

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	TCLP metals (RCRA 8 Metals)	TCLP Organics (SVOCs, VOCs)	Remarks/Contaminant	Sample # (lab only)
Composite Waste Oil Sample @ T-2/156	Comp			1-20-16	1100	1	x	x		-01

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

pH _____ Temp _____

Remarks:

Flow _____ Other _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____	Condition: (lab use only)
Rick Smith	1-21-16	1300			OK
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.3 / Bottles Received: 16	CoC Seals Intact: ___Y ___N ___NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 1-23-16 / Time: 1000	pH Checked: / NCF:

ESC LAB SCIENCES
YOUR LAB OF CHOICE

ANALYTICAL REPORT

September 27, 2016

myESC
REAL TIME DATA ACCESS

BAE Systems-Holston Army Ammunition

Sample Delivery Group:	L860864
Samples Received:	09/21/2016
Project Number:	
Description:	BLDG 156 Waste Oil

Report To: [redacted]

4509 West Stone Drive

Kingsport, TN 37660

Entire Report Reviewed By:

Linda Cashman

Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

DRUMS 1-12 L860864-01 Waste

Collected by: Rick Smith
Collected date/time: 09/20/16 11:00
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG910598	1	09/23/16 12:15	09/23/16 13:15	TRB
Metals (ICP) by Method 6010B	WG910546	1	09/23/16 06:08	09/23/16 09:45	LTB
Preparation by Method 1311	WG909988	1	09/21/16 17:38	09/21/16 17:38	LJN
Preparation by Method 1311	WG910697	1	09/23/16 12:50	09/23/16 12:50	CHH
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG910434	5	09/23/16 02:34	09/23/16 15:48	SNR
Volatile Organic Compounds (GC/MS) by Method 8260B	WG911243	1	09/26/16 14:58	09/26/16 14:58	BMB

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Linda Cashman
Technical Service Representative

Project Narrative

TCLP Volatiles: Due to sample matrix, standard ZHE container could not be used. A 500ml amber glass jar was used instead. Zero headspace cannot be guaranteed due to the sample matrix issues. LLC 9/26/16 08:03

Preparation by Method 1311

Analyte	Result	Qualifier	Prep date / time	Batch
TCLP Extraction	-		9/21/2016 5:38:51 PM	WG909988
TCLP ZHE Extraction	-		9/23/2016 12:50:13 PM	WG910697
Fluid	1		9/21/2016 5:38:51 PM	WG909988
Initial pH	n/a		9/21/2016 5:38:51 PM	WG909988
Final pH	n/a		9/21/2016 5:38:51 PM	WG909988

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.0100	0.20	1	09/23/2016 13:15	WG910598

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.100	5	1	09/23/2016 09:45	WG910546
Barium	0.0689		0.0500	100	1	09/23/2016 09:45	WG910546
Cadmium	ND		0.0200	1	1	09/23/2016 09:45	WG910546
Chromium	ND		0.100	5	1	09/23/2016 09:45	WG910546
Lead	ND		0.0500	5	1	09/23/2016 09:45	WG910546
Selenium	ND		0.100	1	1	09/23/2016 09:45	WG910546
Silver	ND		0.0500	5	1	09/23/2016 09:45	WG910546

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.0500	0.50	1	09/26/2016 14:58	WG911243
Carbon tetrachloride	ND		0.0500	0.50	1	09/26/2016 14:58	WG911243
Chlorobenzene	ND		0.0500	100	1	09/26/2016 14:58	WG911243
Chloroform	ND		0.250	6	1	09/26/2016 14:58	WG911243
1,2-Dichloroethane	ND		0.0500	0.50	1	09/26/2016 14:58	WG911243
1,1-Dichloroethene	ND		0.0500	0.70	1	09/26/2016 14:58	WG911243
2-Butanone (MEK)	ND		0.500	200	1	09/26/2016 14:58	WG911243
Tetrachloroethene	ND		0.0500	0.70	1	09/26/2016 14:58	WG911243
Trichloroethene	ND		0.0500	0.50	1	09/26/2016 14:58	WG911243
Vinyl chloride	ND		0.0500	0.20	1	09/26/2016 14:58	WG911243
(S) Toluene-d8	*107*		*90.0-115*	*114*		*09/26/2016 14:58*	WG911243
(S) Dibromofluoromethane	*106*		*79.0-121*	*125*		*09/26/2016 14:58*	WG911243
(S) a,a,a-Trifluorotoluene	*99.5*		*90.4-116*	*114*		*09/26/2016 14:58*	WG911243
(S) 4-Bromofluorobenzene	*104*		*80.1-120*	*128*		*09/26/2016 14:58*	WG911243

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
1,4-Dichlorobenzene	ND	J3	0.500	7.50	5	09/23/2016 15:48	WG910434
2,4-Dinitrotoluene	ND		0.500	0.13	5	09/23/2016 15:48	WG910434
Hexachlorobenzene	ND		0.500	0.13	5	09/23/2016 15:48	WG910434
Hexachloro-1,3-butadiene	ND		0.500	0.50	5	09/23/2016 15:48	WG910434
Hexachloroethane	ND	J3	0.500	3	5	09/23/2016 15:48	WG910434
Nitrobenzene	ND	J3	0.500	2	5	09/23/2016 15:48	WG910434
Pyridine	ND	J3 J4	0.500	5	5	09/23/2016 15:48	WG910434
3&4-Methyl Phenol	ND	J3	0.500	400	5	09/23/2016 15:48	WG910434
2-Methylphenol	ND	J3	0.500	200	5	09/23/2016 15:48	WG910434
Pentachlorophenol	ND		0.500	100	5	09/23/2016 15:48	WG910434
2,4,5-Trichlorophenol	ND		0.500	400	5	09/23/2016 15:48	WG910434

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
2,4,6-Trichlorophenol	ND		0.500	2	5	09/23/2016 15:48	WG910434
(S) 2-Fluorophenol	*25.0*		*10.0-77.9*	*87*		*09/23/2016 15:48*	WG910434
(S) Phenol-d5	*20.4*		*5.00-70.1*	*67*		*09/23/2016 15:48*	WG910434
(S) Nitrobenzene-d5	*35.9*		*21.8-123*	*120*		*09/23/2016 15:48*	WG910434
(S) 2-Fluorobiphenyl	*48.7*		*29.5-131*	*122*		*09/23/2016 15:48*	WG910434
(S) 2,4,6-Tribromophenol	*56.5*		*11.2-130*	*148*		*09/23/2016 15:48*	WG910434
(S) p-Terphenyl-d14	*51.2*		*29.3-137*	*149*		*09/23/2016 15:48*	WG910434

Sample Narrative:

8270C L860864-01 WG910434: Dilution due to matrix

Method Blank (MB)

(MB) R3165721-1 09/23/16 12:51

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury	U		0.00333	0.0100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3165721-2 09/23/16 12:54 • (LCSD) R3165721-3 09/23/16 12:57

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Mercury	0.0300	0.0304	0.0320	101	107	80-120			5	20

L860923-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L860923-01 09/23/16 13:00 • (MS) R3165721-4 09/23/16 13:03 • (MSD) R3165721-5 09/23/16 13:06

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.0300	ND	0.0302	0.0329	101	110	1	75-125			9	20

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3165659-1 09/23/16 08:59

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	0.0616	J	0.0333	0.100
Barium	U		0.0167	0.0500
Cadmium	U		0.00667	0.0200
Chromium	U		0.0333	0.100
Lead	U		0.0167	0.0500
Selenium	U		0.0333	0.100
Silver	U		0.0167	0.0500

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3165659-2 09/23/16 09:01 • (LCSD) R3165659-3 09/23/16 09:04

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	10.0	9.09	8.91	91	89	80-120			2	20
Barium	10.0	9.52	9.34	95	93	80-120			2	20
Cadmium	10.0	9.14	8.98	91	90	80-120			2	20
Chromium	10.0	9.51	9.35	95	94	80-120			2	20
Lead	10.0	9.59	9.41	96	94	80-120			2	20
Selenium	10.0	9.11	8.96	91	90	80-120			2	20
Silver	10.0	8.85	8.70	88	87	80-120			2	20

L860746-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L860746-01 09/23/16 09:06 • (MS) R3165659-5 09/23/16 09:12 • (MSD) R3165659-6 09/23/16 09:14

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	10.0	ND	9.43	9.29	94	92	1	75-125			2	20
Barium	10.0	0.590	9.94	9.80	93	92	1	75-125			1	20
Cadmium	10.0	0.0257	9.34	9.20	93	92	1	75-125			2	20
Chromium	10.0	ND	9.44	9.27	94	93	1	75-125			2	20
Lead	10.0	ND	9.67	9.52	96	95	1	75-125			2	20
Selenium	10.0	ND	9.46	9.39	95	94	1	75-125			1	20
Silver	10.0	ND	9.04	8.92	90	89	1	75-125			1	20

Method Blank (MB)

(MB) R3166244-3 09/26/16 08:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.0167	0.0500
Carbon tetrachloride	U		0.0167	0.0500
Chlorobenzene	U		0.0167	0.0500
Chloroform	U		0.0833	0.250
1,2-Dichloroethane	U		0.0167	0.0500
1,1-Dichloroethene	U		0.0167	0.0500
2-Butanone (MEK)	U		0.167	0.500
Tetrachloroethene	U		0.0167	0.0500
Trichloroethene	U		0.0167	0.0500
Vinyl chloride	U		0.0167	0.0500
(S) Toluene-d8	*109*			*90.0-115*
(S) Dibromofluoromethane	*113*			*79.0-121*
(S) a,a,a-Trifluorotoluene	*99.0*			*90.4-116*
(S) 4-Bromofluorobenzene	*101*			*80.1-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3166244-1 09/26/16 00:58 • (LCSD) R3166244-2 09/26/16 01:18

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0293	0.0295	117	118	73.0-122			0.670	20
Carbon tetrachloride	0.0250	0.0252	0.0265	101	106	70.9-129			4.80	20
Chlorobenzene	0.0250	0.0242	0.0250	96.9	100	79.7-122			3.25	20
Chloroform	0.0250	0.0280	0.0289	112	116	73.2-125			3.28	20
1,2-Dichloroethane	0.0250	0.0261	0.0271	104	108	65.3-126			3.88	20
1,1-Dichloroethene	0.0250	0.0284	0.0298	114	119	60.6-133			4.91	20
2-Butanone (MEK)	0.125	0.108	0.111	86.7	88.7	46.4-155			2.32	20
Tetrachloroethene	0.0250	0.0222	0.0226	88.9	90.4	73.5-130			1.63	20
Trichloroethene	0.0250	0.0249	0.0247	99.8	98.9	79.5-121			0.920	20
Vinyl chloride	0.0250	0.0311	0.0319	124	128	61.5-134			2.58	20
(S) Toluene-d8				*110*	*110*	*90.0-115*				
(S) Dibromofluoromethane				*111*	*114*	*79.0-121*				
(S) a,a,a-Trifluorotoluene				*98.7*	*99.1*	*90.4-116*				
(S) 4-Bromofluorobenzene				*99.3*	*100*	*80.1-120*				

L861336-08 Original Sample (OS) • Matrix Spike (MS)

(OS) L861336-08 09/26/16 13:57 • (MS) R3166244-4 09/26/16 10:21

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Benzene	1.25	ND	1.24	98.9	1	58.6-133	
Carbon tetrachloride	1.25	ND	1.15	91.8	1	60.6-139	
Chlorobenzene	1.25	ND	1.13	90.2	1	70.1-130	
Chloroform	1.25	ND	1.26	101	1	66.1-133	
1,2-Dichloroethane	1.25	ND	1.18	94.5	1	60.7-132	
1,1-Dichloroethene	1.25	ND	1.25	99.8	1	48.8-144	
2-Butanone (MEK)	6.25	ND	5.44	87.0	1	45.0-156	
Tetrachloroethene	1.25	ND	0.964	77.2	1	57.4-141	
Trichloroethene	1.25	ND	1.98	158	1	48.9-148	J5
Vinyl chloride	1.25	ND	1.26	100	1	44.3-143	
(S) Toluene-d8				*109*		*90.0-115*	
(S) Dibromofluoromethane				*103*		*79.0-121*	
(S) a,a,a-Trifluorotoluene				*97.2*		*90.4-116*	
(S) 4-Bromofluorobenzene				*100*		*80.1-120*	

L861354-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L861354-06 09/26/16 13:37 • (MS) R3166244-6 09/26/16 10:41 • (MSD) R3166244-7 09/26/16 11:01

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	1.25	ND	1.25	1.24	99.8	99.2	1	58.6-133			0.630	20
Carbon tetrachloride	1.25	ND	1.13	1.12	90.8	89.7	1	60.6-139			1.18	20
Chlorobenzene	1.25	ND	1.17	1.17	93.3	93.3	1	70.1-130			0.0300	20
Chloroform	1.25	ND	1.25	1.27	100	102	1	66.1-133			1.61	20
1,2-Dichloroethane	1.25	ND	1.16	1.15	92.8	92.4	1	60.7-132			0.470	20
1,1-Dichloroethene	1.25	ND	1.20	1.18	95.7	94.4	1	48.8-144			1.37	20
2-Butanone (MEK)	6.25	ND	4.99	5.22	79.9	83.5	1	45.0-156			4.45	20.8
Tetrachloroethene	1.25	ND	1.01	0.987	80.9	79.0	1	57.4-141			2.37	20
Trichloroethene	1.25	ND	1.11	1.07	88.9	85.8	1	48.9-148			3.57	20
Vinyl chloride	1.25	ND	1.16	1.17	92.7	93.3	1	44.3-143			0.640	20
(S) Toluene-d8					*107*	*108*		*90.0-115*				
(S) Dibromofluoromethane					*109*	*110*		*79.0-121*				
(S) a,a,a-Trifluorotoluene					*97.8*	*98.9*		*90.4-116*				
(S) 4-Bromofluorobenzene					*97.3*	*100*		*80.1-120*				

Method Blank (MB)

(MB) R3165922-3 09/23/16 10:43

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
1,4-Dichlorobenzene	U		0.0333	0.100
2,4-Dinitrotoluene	U		0.0333	0.100
Hexachlorobenzene	U		0.0333	0.100
Hexachloro-1,3-butadiene	U		0.0333	0.100
Hexachloroethane	U		0.0333	0.100
Nitrobenzene	U		0.0333	0.100
Pyridine	U		0.0333	0.100
2-Methylphenol	U		0.0333	0.100
3&4-Methyl Phenol	U		0.0333	0.100
Pentachlorophenol	U		0.0333	0.100
2,4,5-Trichlorophenol	U		0.0333	0.100
2,4,6-Trichlorophenol	U		0.0333	0.100
(S) Nitrobenzene-d5	*26.1*			*21.8-123*
(S) 2-Fluorobiphenyl	*36.8*			*29.5-131*
(S) p-Terphenyl-d14	*73.7*			*29.3-137*
(S) Phenol-d5	*17.2*			*5.00-70.1*
(S) 2-Fluorophenol	*21.0*			*10.0-77.9*
(S) 2,4,6-Tribromophenol	*63.9*			*11.2-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3165922-1 09/23/16 09:33 • (LCSD) R3165922-2 09/23/16 09:56

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,4-Dichlorobenzene	0.0500	0.0141	0.0213	28.3	42.6	21.0-89.4		J3	40.3	32.6
2,4-Dinitrotoluene	0.0500	0.0394	0.0379	78.9	75.7	31.2-105			4.05	22
Hexachlorobenzene	0.0500	0.0382	0.0365	76.5	73.0	38.5-116			4.60	20.1
Hexachloro-1,3-butadiene	0.0500	0.0197	0.0251	39.4	50.3	16.1-104			24.2	31.2
Hexachloroethane	0.0500	0.0143	0.0212	28.6	42.5	16.5-89.8		J3	39.0	30.7
Nitrobenzene	0.0500	0.0182	0.0242	36.5	48.3	31.4-106		J3	27.9	25.7
Pyridine	0.0500	0.00549	0.00860	11.0	17.2	13.5-58.9	J4	J3	44.1	32.5
2-Methylphenol	0.0500	0.0175	0.0233	34.9	46.6	26.4-86.9		J3	28.7	26.5
3&4-Methyl Phenol	0.0500	0.0205	0.0271	40.9	54.2	27.9-92.0		J3	27.9	27
Pentachlorophenol	0.0500	0.0274	0.0273	54.7	54.5	10.0-97.4			0.310	35.1
2,4,5-Trichlorophenol	0.0500	0.0332	0.0328	66.4	65.6	34.9-112			1.13	23.9
2,4,6-Trichlorophenol	0.0500	0.0300	0.0307	59.9	61.3	29.8-107			2.37	24.1
(S) Nitrobenzene-d5				*37.0*	*46.5*	*21.8-123*				
(S) 2-Fluorobiphenyl				*60.5*	*59.7*	*29.5-131*				
(S) p-Terphenyl-d14				*73.9*	*69.0*	*29.3-137*				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3165922-1 09/23/16 09:33 • (LCSD) R3165922-2 09/23/16 09:56

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) Phenol-d5				*20.4*	*29.1*	*5.00-70.1*				
(S) 2-Fluorophenol				*23.9*	*35.6*	*10.0-77.9*				
(S) 2,4,6-Tribromophenol				*79.7*	*75.3*	*11.2-130*				

L860626-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L860626-02 09/23/16 11:30 • (MS) R3165922-4 09/23/16 11:53 • (MSD) R3165922-5 09/23/16 12:17

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
1,4-Dichlorobenzene	0.500	ND	0.208	0.202	41.7	40.5	1	14.0-104			2.93	36.4
2,4-Dinitrotoluene	0.500	ND	0.401	0.390	80.3	78.0	1	16.2-135			2.91	20.6
Hexachlorobenzene	0.500	ND	0.388	0.381	77.7	76.2	1	31.9-135			1.94	20
Hexachloro-1,3-butadiene	0.500	ND	0.259	0.256	51.7	51.1	1	15.7-109			1.15	37.6
Hexachloroethane	0.500	ND	0.200	0.202	40.0	40.3	1	10.4-105			0.640	40
Nitrobenzene	0.500	ND	0.238	0.239	47.6	47.7	1	23.1-121			0.190	29
Pyridine	0.500	ND	0.0777	0.0780	15.5	15.6	1	10.0-77.8			0.360	38.8
2-Methylphenol	0.500	ND	0.235	0.221	46.9	44.1	1	10.0-133			6.17	40
3&4-Methyl Phenol	0.500	ND	0.258	0.257	51.6	51.3	1	17.4-100			0.560	27.7
Pentachlorophenol	0.500	ND	0.319	0.307	63.9	61.4	1	10.0-108			3.91	40
2,4,5-Trichlorophenol	0.500	ND	0.360	0.357	72.0	71.3	1	30.6-120			0.890	33.8
2,4,6-Trichlorophenol	0.500	ND	0.339	0.342	67.8	68.4	1	19.1-114			0.820	29.9
(S) Nitrobenzene-d5					*48.9*	*49.3*		*21.8-123*				
(S) 2-Fluorobiphenyl					*64.2*	*63.6*		*29.5-131*				
(S) p-Terphenyl-d14					*76.8*	*74.8*		*29.3-137*				
(S) Phenol-d5					*27.7*	*26.9*		*5.00-70.1*				
(S) 2-Fluorophenol					*32.9*	*33.2*		*10.0-77.9*				
(S) 2,4,6-Tribromophenol					*87.3*	*83.2*		*11.2-130*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE.**

***** Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

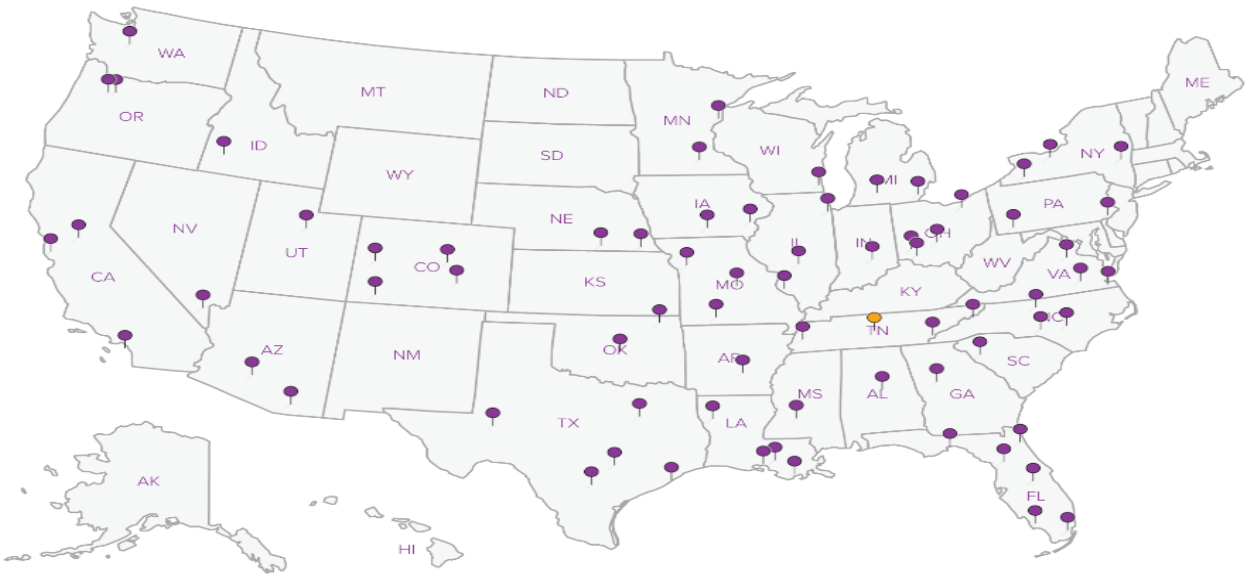
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

[1.] Drinking Water [2.] Underground Storage Tanks [3.] Aquatic Toxicity [4.] Chemical/Microbiological [5.] Mold [n/a] Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



BAE Systems-Holston Army Ammunition

4509 West Stone Drive
Kingsport, TN 37660

Billing Information:

Attn: Accounts Payable
4509 West Stone Drive
Kingsport, TN 37660

Report to: [redacted]

Email To: SAME

Project Description: BLDG 156 WASTE OIL

City/State Collected: KPT-TN

Phone: [redacted]

Fax:

Client Project #

Lab Project #

Collected by (print): R Smith

Site/Facility ID #

P.O. # JAE-08-0110-01

Collected by (signature): R Smith

Immediately Packed on Ice N ___ (Y)

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No ✓Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	TCLP Metals, TCLP SVOC, TCLP VOC										Rem./Contaminant	Sample # (lab only)
Drums 1-12	comp	OT		9-20-16	1100	1	X											01

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other OIL

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Chain of Custody Page ___ of ___

ESC LAB SCIENCES

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12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 160864

E152

Acctnum: **BAESYSKTN**

Template:

Prelogin:

TSR: **650 - Linda Cashman**

PB:

Shipped Via:

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Rick Smith	9-20-16	1330	AJ Burkhardt
Reiinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)
			Wes Bu

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ____

Temp: 3.1 °C Bottles Received: 1 G

Date: 9-21-16 Time: 0900

Condition: (lab use only) OK M12

COC Seal Intact: ___Y ___N ___NA

pH Checked: NCF:

ESC
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Cooler Receipt Form

Client:	BAESYSKTN	SDG#	860864
Cooler Received/Opened On:	9-21-16	Temperature Upon Receipt:	3.1 °c
Received By:	Westly Benson		
Signature:			

Receipt Check List	Yes	No	N/A
Were custody seals on outside of cooler and intact?	1		
Were custody papers properly filled out?	/		
Did all bottles arrive in good condition?	/		
Were correct bottles used for the analyses requested?	/		
Was sufficient amount of sample sent in each bottle?	/		
Were all applicable sample containers correctly preserved and checked for preservation? (Any not in accepted range noted on COC)			/
If applicable, was an observable VOA headspace present?			/
Non Conformance Generated. (If yes see attached NCF)			

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ANALYTICAL REPORT

September 27, 2016

myESC
REAL TIME DATA ACCESS

BAE Systems-Holston Army Ammunition

Sample Delivery Group:	L860873
Samples Received:	09/21/2016
Project Number:	
Description:	BLDG 156 Waste Oil

Report To: [redacted]

4509 West Stone Drive

Kingsport, TN 37660

Entire Report Reviewed By:

Linda Cashman

Linda Cashman
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

DRUM #1 L860873-01 Solid

Collected by: Rick Smith
Collected date/time: 09/20/16 11:30
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG910694	20	09/23/16 20:32	09/24/16 14:35	JNS

DRUM #2 L860873-02 Solid

Collected by: Rick Smith
Collected date/time: 09/20/16 11:40
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG910694	20	09/23/16 20:32	09/24/16 14:47	JNS

DRUM #3 L860873-03 Solid

Collected by: Rick Smith
Collected date/time: 09/20/16 11:50
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG910694	20	09/23/16 20:32	09/24/16 15:00	JNS

DRUM #4 L860873-04 Solid

Collected by: Rick Smith
Collected date/time: 09/20/16 12:00
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG910694	20	09/23/16 20:32	09/24/16 15:12	JNS

DRUM #5 L860873-05 Solid

Collected by: Rick Smith
Collected date/time: 09/20/16 12:10
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG910694	20	09/23/16 20:32	09/24/16 15:25	JNS

DRUM #6 L860873-06 Solid

Collected by: Rick Smith
Collected date/time: 09/20/16 12:15
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG910694	20	09/23/16 20:32	09/24/16 15:37	JNS

DRUM #7 L860873-07 Solid

Collected by: Rick Smith
Collected date/time: 09/20/16 12:20
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG910694	20	09/23/16 20:32	09/24/16 15:49	JNS

DRUM #8 L860873-08 Solid

Collected by: Rick Smith
Collected date/time: 09/20/16 12:25
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG910694	20	09/23/16 20:32	09/24/16 16:02	JNS

DRUM #9 L860873-09 Solid

Collected by: Rick Smith
Collected date/time: 09/20/16 12:30
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG910694	20	09/23/16 20:32	09/24/16 16:14	JNS

DRUM #10 L860873-10 Solid

Collected by: Rick Smith
Collected date/time: 09/20/16 12:35
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG910694	20	09/23/16 20:32	09/24/16 16:27	JNS

DRUM #11 L860873-11 Solid

Collected by: Rick Smith
Collected date/time: 09/20/16 12:40
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG910694	20	09/23/16 20:32	09/24/16 16:39	JNS

DRUM #12 L860873-12 Solid

Collected by: Rick Smith
Collected date/time: 09/20/16 12:45
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG910694	20	09/23/16 20:32	09/24/16 16:51	JNS

DRUM #13 L860873-13 Solid

Collected by: Rick Smith
Collected date/time: 09/20/16 12:55
Received date/time: 09/21/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG910694	20	09/23/16 20:32	09/24/16 17:04	JNS

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

[Preliminary Report]

Linda Cashman
Technical Service Representative

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1262	ND		20.0	20	09/24/2016 14:35	WG910694
PCB 1016	ND		20.0	20	09/24/2016 14:35	WG910694
PCB 1221	ND		20.0	20	09/24/2016 14:35	WG910694
PCB 1232	ND		20.0	20	09/24/2016 14:35	WG910694
PCB 1242	ND		20.0	20	09/24/2016 14:35	WG910694
PCB 1248	ND		20.0	20	09/24/2016 14:35	WG910694
PCB 1254	ND		20.0	20	09/24/2016 14:35	WG910694
PCB 1260	ND		20.0	20	09/24/2016 14:35	WG910694
(S) Decachlorobiphenyl	*84.1*	J7	*60.0-140*		*09/24/2016 14:35*	WG910694
(S) Tetrachloro-m-xylene	*109*	J7	*60.0-140*		*09/24/2016 14:35*	WG910694

Sample Narrative:

8082M L860873-01 WG910694: Dilution due to matrix

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1262	ND		20.0	20	09/24/2016 14:47	WG910694
PCB 1016	ND		20.0	20	09/24/2016 14:47	WG910694
PCB 1221	ND		20.0	20	09/24/2016 14:47	WG910694
PCB 1232	ND		20.0	20	09/24/2016 14:47	WG910694
PCB 1242	ND		20.0	20	09/24/2016 14:47	WG910694
PCB 1248	ND		20.0	20	09/24/2016 14:47	WG910694
PCB 1254	ND		20.0	20	09/24/2016 14:47	WG910694
PCB 1260	ND		20.0	20	09/24/2016 14:47	WG910694
(S) Decachlorobiphenyl	*81.2*	J7	*60.0-140*		*09/24/2016 14:47*	WG910694
(S) Tetrachloro-m-xylene	*104*	J7	*60.0-140*		*09/24/2016 14:47*	WG910694

Sample Narrative:

8082M L860873-02 WG910694: Dilution due to matrix

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1262	ND		20.0	20	09/24/2016 15:00	WG910694
PCB 1016	ND		20.0	20	09/24/2016 15:00	WG910694
PCB 1221	ND		20.0	20	09/24/2016 15:00	WG910694
PCB 1232	ND		20.0	20	09/24/2016 15:00	WG910694
PCB 1242	ND		20.0	20	09/24/2016 15:00	WG910694
PCB 1248	ND		20.0	20	09/24/2016 15:00	WG910694
PCB 1254	ND		20.0	20	09/24/2016 15:00	WG910694
PCB 1260	ND		20.0	20	09/24/2016 15:00	WG910694
(S) Decachlorobiphenyl	*83.6*	J7	*60.0-140*		*09/24/2016 15:00*	WG910694
(S) Tetrachloro-m-xylene	*112*	J7	*60.0-140*		*09/24/2016 15:00*	WG910694

Sample Narrative:

8082M L860873-03 WG910694: Dilution due to matrix

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1262	ND		20.0	20	09/24/2016 15:12	WG910694
PCB 1016	ND		20.0	20	09/24/2016 15:12	WG910694
PCB 1221	ND		20.0	20	09/24/2016 15:12	WG910694
PCB 1232	ND		20.0	20	09/24/2016 15:12	WG910694
PCB 1242	ND		20.0	20	09/24/2016 15:12	WG910694
PCB 1248	ND		20.0	20	09/24/2016 15:12	WG910694
PCB 1254	ND		20.0	20	09/24/2016 15:12	WG910694
PCB 1260	ND		20.0	20	09/24/2016 15:12	WG910694
(S) Decachlorobiphenyl	*76.3*	J7	*60.0-140*		*09/24/2016 15:12*	WG910694
(S) Tetrachloro-m-xylene	*103*	J7	*60.0-140*		*09/24/2016 15:12*	WG910694

Sample Narrative:

8082M L860873-04 WG910694: Dilution due to matrix

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1262	ND		20.0	20	09/24/2016 15:25	WG910694
PCB 1016	ND		20.0	20	09/24/2016 15:25	WG910694
PCB 1221	ND		20.0	20	09/24/2016 15:25	WG910694
PCB 1232	ND		20.0	20	09/24/2016 15:25	WG910694
PCB 1242	ND		20.0	20	09/24/2016 15:25	WG910694
PCB 1248	ND		20.0	20	09/24/2016 15:25	WG910694
PCB 1254	ND		20.0	20	09/24/2016 15:25	WG910694
PCB 1260	ND		20.0	20	09/24/2016 15:25	WG910694
(S) Decachlorobiphenyl	*99.0*	J7	*60.0-140*		*09/24/2016 15:25*	WG910694
(S) Tetrachloro-m-xylene	*129*	J7	*60.0-140*		*09/24/2016 15:25*	WG910694

Sample Narrative:

8082M L860873-05 WG910694: Dilution due to matrix

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1262	ND		20.0	20	09/24/2016 15:37	WG910694
PCB 1016	ND		20.0	20	09/24/2016 15:37	WG910694
PCB 1221	ND		20.0	20	09/24/2016 15:37	WG910694
PCB 1232	ND		20.0	20	09/24/2016 15:37	WG910694
PCB 1242	ND		20.0	20	09/24/2016 15:37	WG910694
PCB 1248	ND		20.0	20	09/24/2016 15:37	WG910694
PCB 1254	ND		20.0	20	09/24/2016 15:37	WG910694
PCB 1260	ND		20.0	20	09/24/2016 15:37	WG910694
(S) Decachlorobiphenyl	*80.3*	J7	*60.0-140*		*09/24/2016 15:37*	WG910694
(S) Tetrachloro-m-xylene	*95.5*	J7	*60.0-140*		*09/24/2016 15:37*	WG910694

Sample Narrative:

8082M L860873-06 WG910694: Dilution due to matrix

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1262	ND		20.0	20	09/24/2016 15:49	WG910694
PCB 1016	ND		20.0	20	09/24/2016 15:49	WG910694
PCB 1221	ND		20.0	20	09/24/2016 15:49	WG910694
PCB 1232	ND		20.0	20	09/24/2016 15:49	WG910694
PCB 1242	ND		20.0	20	09/24/2016 15:49	WG910694
PCB 1248	ND		20.0	20	09/24/2016 15:49	WG910694
PCB 1254	ND		20.0	20	09/24/2016 15:49	WG910694
PCB 1260	ND		20.0	20	09/24/2016 15:49	WG910694
(S) Decachlorobiphenyl	*79.7*	J7	*60.0-140*		*09/24/2016 15:49*	WG910694
(S) Tetrachloro-m-xylene	*96.8*	J7	*60.0-140*		*09/24/2016 15:49*	WG910694

Sample Narrative:

8082M L860873-07 WG910694: Dilution due to matrix

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1262	ND		20.0	20	09/24/2016 16:02	WG910694
PCB 1016	ND		20.0	20	09/24/2016 16:02	WG910694
PCB 1221	ND		20.0	20	09/24/2016 16:02	WG910694
PCB 1232	ND		20.0	20	09/24/2016 16:02	WG910694
PCB 1242	ND		20.0	20	09/24/2016 16:02	WG910694
PCB 1248	ND		20.0	20	09/24/2016 16:02	WG910694
PCB 1254	ND		20.0	20	09/24/2016 16:02	WG910694
PCB 1260	ND		20.0	20	09/24/2016 16:02	WG910694
(S) Decachlorobiphenyl	*67.1*	J7	*60.0-140*		*09/24/2016 16:02*	WG910694
(S) Tetrachloro-m-xylene	*103*	J7	*60.0-140*		*09/24/2016 16:02*	WG910694

Sample Narrative:

8082M L860873-08 WG910694: Dilution due to matrix

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1262	ND		20.0	20	09/24/2016 16:14	WG910694
PCB 1016	ND		20.0	20	09/24/2016 16:14	WG910694
PCB 1221	ND		20.0	20	09/24/2016 16:14	WG910694
PCB 1232	ND		20.0	20	09/24/2016 16:14	WG910694
PCB 1242	ND		20.0	20	09/24/2016 16:14	WG910694
PCB 1248	ND		20.0	20	09/24/2016 16:14	WG910694
PCB 1254	ND		20.0	20	09/24/2016 16:14	WG910694
PCB 1260	ND		20.0	20	09/24/2016 16:14	WG910694
(S) Decachlorobiphenyl	*80.9*	J7	*60.0-140*		*09/24/2016 16:14*	WG910694
(S) Tetrachloro-m-xylene	*101*	J7	*60.0-140*		*09/24/2016 16:14*	WG910694

Sample Narrative:

8082M L860873-09 WG910694: Dilution due to matrix

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1262	ND		20.0	20	09/24/2016 16:27	WG910694
PCB 1016	ND		20.0	20	09/24/2016 16:27	WG910694
PCB 1221	ND		20.0	20	09/24/2016 16:27	WG910694
PCB 1232	ND		20.0	20	09/24/2016 16:27	WG910694
PCB 1242	ND		20.0	20	09/24/2016 16:27	WG910694
PCB 1248	ND		20.0	20	09/24/2016 16:27	WG910694
PCB 1254	ND		20.0	20	09/24/2016 16:27	WG910694
PCB 1260	ND		20.0	20	09/24/2016 16:27	WG910694
(S) Decachlorobiphenyl	*76.2*	J7	*60.0-140*		*09/24/2016 16:27*	WG910694
(S) Tetrachloro-m-xylene	*92.7*	J7	*60.0-140*		*09/24/2016 16:27*	WG910694

Sample Narrative:

8082M L860873-10 WG910694: Dilution due to matrix

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1262	ND		20.0	20	09/24/2016 16:39	WG910694
PCB 1016	ND		20.0	20	09/24/2016 16:39	WG910694
PCB 1221	ND		20.0	20	09/24/2016 16:39	WG910694
PCB 1232	ND		20.0	20	09/24/2016 16:39	WG910694
PCB 1242	ND		20.0	20	09/24/2016 16:39	WG910694
PCB 1248	ND		20.0	20	09/24/2016 16:39	WG910694
PCB 1254	ND		20.0	20	09/24/2016 16:39	WG910694
PCB 1260	ND		20.0	20	09/24/2016 16:39	WG910694
(S) Decachlorobiphenyl	*79.6*	J7	*60.0-140*		*09/24/2016 16:39*	WG910694
(S) Tetrachloro-m-xylene	*106*	J7	*60.0-140*		*09/24/2016 16:39*	WG910694

Sample Narrative:

8082M L860873-11 WG910694: Dilution due to matrix

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1262	ND		20.0	20	09/24/2016 16:51	WG910694
PCB 1016	ND		20.0	20	09/24/2016 16:51	WG910694
PCB 1221	ND		20.0	20	09/24/2016 16:51	WG910694
PCB 1232	ND		20.0	20	09/24/2016 16:51	WG910694
PCB 1242	ND		20.0	20	09/24/2016 16:51	WG910694
PCB 1248	ND		20.0	20	09/24/2016 16:51	WG910694
PCB 1254	ND		20.0	20	09/24/2016 16:51	WG910694
PCB 1260	ND		20.0	20	09/24/2016 16:51	WG910694
(S) Decachlorobiphenyl	*80.5*	J7	*60.0-140*		*09/24/2016 16:51*	WG910694
(S) Tetrachloro-m-xylene	*105*	J7	*60.0-140*		*09/24/2016 16:51*	WG910694

Sample Narrative:

8082M L860873-12 WG910694: Dilution due to matrix

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
PCB 1262	ND		20.0	20	09/24/2016 17:04	WG910694
PCB 1016	ND		20.0	20	09/24/2016 17:04	WG910694
PCB 1221	ND		20.0	20	09/24/2016 17:04	WG910694
PCB 1232	ND		20.0	20	09/24/2016 17:04	WG910694
PCB 1242	ND		20.0	20	09/24/2016 17:04	WG910694
PCB 1248	ND		20.0	20	09/24/2016 17:04	WG910694
PCB 1254	ND		20.0	20	09/24/2016 17:04	WG910694
PCB 1260	ND		20.0	20	09/24/2016 17:04	WG910694
(S) Decachlorobiphenyl	*81.2*	J7	*60.0-140*		*09/24/2016 17:04*	WG910694
(S) Tetrachloro-m-xylene	*100*	J7	*60.0-140*		*09/24/2016 17:04*	WG910694

Sample Narrative:

8082M L860873-13 WG910694: Dilution due to matrix

Method Blank (MB)

(MB) R3166289-1 09/24/16 13:45

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
PCB 1260	U		0.330	1.00
PCB 1016	U		0.330	1.00
PCB 1221	U		0.330	1.00
PCB 1232	U		0.330	1.00
PCB 1242	U		0.330	1.00
PCB 1248	U		0.330	1.00
PCB 1254	U		0.330	1.00
PCB 1262	U		0.330	1.00
(S) Decachlorobiphenyl	*105*			*60.0-140*
(S) Tetrachloro-m-xylene	*108*			*60.0-140*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3166289-2 09/24/16 13:58 • (LCSD) R3166289-3 09/24/16 14:10

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
PCB 1260	0.500	0.590	0.588	118	118	60.0-140			0.440	20
PCB 1016	0.500	0.673	0.671	135	134	60.0-140			0.250	20
(S) Decachlorobiphenyl				*114*	*113*	*60.0-140*				
(S) Tetrachloro-m-xylene				*118*	*116*	*60.0-140*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE.**

***** Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

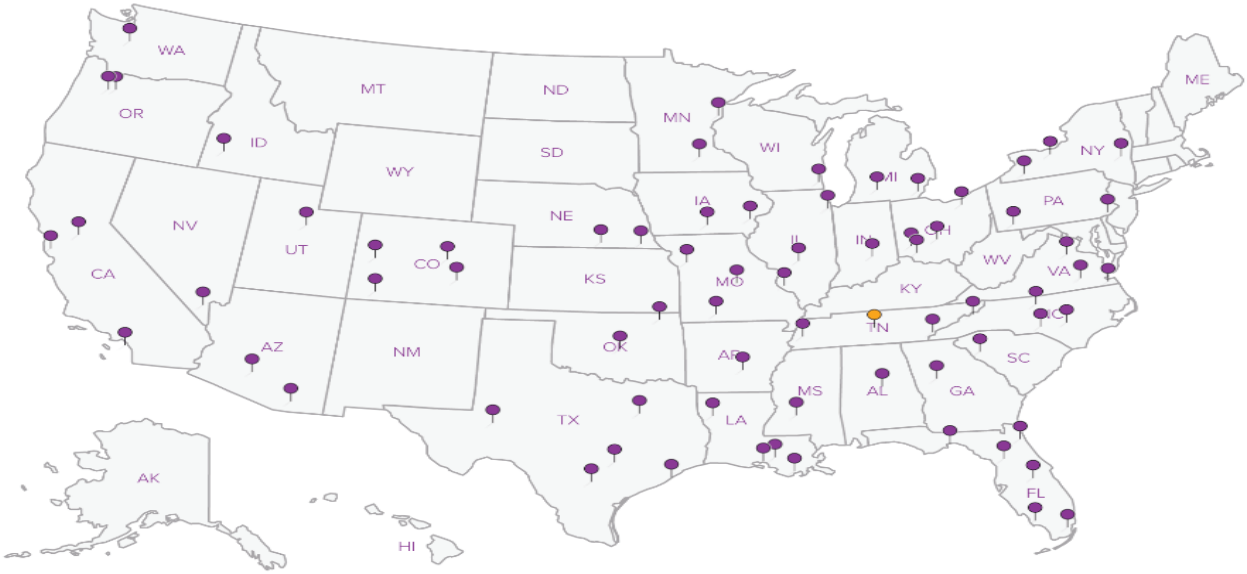
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

[1.] Drinking Water [2.] Underground Storage Tanks [3.] Aquatic Toxicity [4.] Chemical/Microbiological [5.] Mold [n/a] Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



BAE Systems-Holston Army Ammunition

4509 West Stone Drive
Kingsport, TN 37660

Report to: [redacted]

Billing Information:

Attn: Accounts Payable
4509 West Stone Drive
Kingsport, TN 37660

Email To: SAME

Project Description: BLDG 156 WASTE OIL

City/State Collected: KPT-TN

Phone: [redacted]
Fax:

Client Project #

Lab Project #

Collected by (print): RSmith

Site/Facility ID #

P.O. # JAE-080110-01

Collected by (signature): RSmith

Immediately Packed on Ice N ___ (Y)

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No _Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	PCB's										Rem./Contaminant	Sample # (lab only)
DRUM #1	GRAB	OT		9-20-16	1130	1	X											01
DRUM #2	GRAB	OT		9-20-16	1140	1	X											02
DRUM #3	GRAB	OT		9-20-16	1150	1	X											03
DRUM #4	GRAB	OT		9-20-16	1200	1	X											04
DRUM #5	GRAB	OT		9-20-16	1210	1	X											05
DRUM #6	GRAB	OT		9-20-16	1215	1	X											06
DRUM #7	GRAB	OT		9-20-16	1220	1	X											07
DRUM #8	GRAB	OT		9-20-16	1225	1	X											08
DRUM #9	GRAB	OT		9-20-16	1230	1	X											09
DRUM #10	GRAB	OT		9-20-16	1235	1	X											10

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other OIL

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC LAB SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 060873

E151

Acctnum: BAESYSKTN
Template:
Prelogin:
TSR: 650 - Linda Cashman
PB:
Shipped Via:

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
RickSmith	9-20-16	1330	AG Burchfield
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)
			Giles Bur

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ____
Temp: 3.1 °C Bottles Received: 13 V
Date: 9-21-16 Time: 0900

Hold #
Condition: (lab use only) OK
COC Seal Intact: ___Y ___N ___NA
pH Checked: NCF:

BAE Systems-Holston Army Ammunition

4509 West Stone Drive
Kingsport, TN 37660

Billing Information:

Attn: Accounts Payable
4509 West Stone Drive
Kingsport, TN 37660

Report to: [redacted]

Email To: SAME

Project Description: BLDG 156 WASTE OIL

City/State Collected: KPT-TN

Phone: [redacted]
Fax:

Client Project #

Lab Project #

Collected by (print): RSmith

Site/Facility ID #

P.O. # JAE-080110-01

Collected by (signature): RS

Immediately Packed on Ice N (Y)

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No ___Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Analysis / Container / Preservative: PCB's	Rem./Contaminant	Sample # (lab only)
DRUM #11	GRAB	OT		9-20-16	1240	1	X		11
DRUM #12	GRAB	OT		9-20-16	1245	1	X		12
DRUM #13	GRAB	OT		9-20-16	1255	1	X		13

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other OIL

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Chain of Custody Page ___ of ___

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 860873

Table #

Acctnum: **BAESYSKTN**

Template:

Prelogin:

TSR: 650 - Linda Cashman

PB:

Shipped Via:

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Rick Smith	9-20-16	1330	[signature]
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)
			[signature]

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.1 °C Bottles Received: 13

Date: 9-21-16 Time: 0900

Condition: (lab use only) MCL

COC Seal Intact: ___Y ___N ___NA

pH Checked: NCF:

Hold #

ESC
L·A·B S·C·I·E·N·C·E·S
YOUR LAB OF CHOICE

Cooler Receipt Form

Client:	BAESYSKTN	SDG#	860873
Cooler Received/Opened On:	5-21-16	Temperature Upon Receipt:	3.1 °c
Received By:	Westly Benson		
Signature:			

Receipt Check List	Yes	No	N/A
Were custody seals on outside of cooler and intact?	/		
Were custody papers properly filled out?	/		
Did all bottles arrive in good condition?	/		
Were correct bottles used for the analyses requested?	/		
Was sufficient amount of sample sent in each bottle?	/		
Were all applicable sample containers correctly preserved and checked for preservation? (Any not in accepted range noted on COC)			/
If applicable, was an observable VOA headspace present?			/
Non Conformance Generated. (If yes see attached NCF)			

ANALYTICAL REPORT

November 17, 2017

BAE Systems-Holston Army Ammunition

Sample Delivery Group:	L947909
Samples Received:	11/02/2017
Project Number:	
Description:	Bldg 156 Waste Oil

Report To: [redacted]

4509 West Stone Drive

Kingsport, TN 37660

Entire Report Reviewed By:

Linda Cashman

Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

DRUMS 1-8 L947909-01 Solid

Collected by: Daniel Reed | Collected date/time: 11/01/17 09:30 | Received date/time: 11/02/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9023	WG1038641	1	11/03/17 07:47	11/03/17 11:35	SJM

DRUMS 1-8 L947909-02 Waste

Collected by: Daniel Reed | Collected date/time: 11/01/17 09:30 | Received date/time: 11/02/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Preparation by Method 1311	WG1039501	1	11/07/17 07:00	11/07/17 07:00	KK
Preparation by Method 1311	WG1039822	1	11/07/17 08:44	11/07/17 08:44	KK
Wet Chemistry by Method D93/1010A	WG1042266	1	11/15/17 01:54	11/15/17 01:54	MZ
Mercury by Method 7470A	WG1040252	3	11/08/17 08:11	11/08/17 12:12	RDS
Metals (ICP) by Method 6010B	WG1040285	1	11/08/17 08:51	11/08/17 11:27	TRB
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1040314	1	11/08/17 15:08	11/08/17 15:08	BMB
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1040566	1	11/08/17 15:55	11/09/17 17:09	KMP
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1040566	10	11/08/17 15:55	11/13/17 12:22	KMP

DRUMS 1 L947909-03 Solid

Collected by: Daniel Reed | Collected date/time: 11/01/17 08:30 | Received date/time: 11/02/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG1038835	1	11/04/17 11:47	11/06/17 12:16	JNS

DRUMS 2 L947909-04 Solid

Collected by: Daniel Reed | Collected date/time: 11/01/17 08:40 | Received date/time: 11/02/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG1038835	1	11/04/17 11:47	11/06/17 12:31	JNS

DRUMS 3 L947909-05 Solid

Collected by: Daniel Reed | Collected date/time: 11/01/17 08:45 | Received date/time: 11/02/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG1038835	1	11/04/17 11:47	11/06/17 12:46	JNS

DRUMS 4 L947909-06 Solid

Collected by: Daniel Reed | Collected date/time: 11/01/17 08:50 | Received date/time: 11/02/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG1038835	1	11/04/17 11:47	11/06/17 13:01	JNS

DRUMS 5 L947909-07 Solid

Collected by: Daniel Reed | Collected date/time: 11/01/17 08:55 | Received date/time: 11/02/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG1038835	1	11/04/17 11:47	11/06/17 13:16	JNS

DRUMS 6 L947909-08 Solid

Collected by: Daniel Reed
Collected date/time: 11/01/17 08:00
Received date/time: 11/02/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG1038835	1	11/04/17 11:47	11/06/17 13:31	JNS

DRUMS 7 L947909-09 Solid

Collected by: Daniel Reed
Collected date/time: 11/01/17 09:05
Received date/time: 11/02/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG1038835	1	11/04/17 11:47	11/06/17 13:46	JNS

DRUMS 8 L947909-10 Solid

Collected by: Daniel Reed
Collected date/time: 11/01/17 09:10
Received date/time: 11/02/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Polychlorinated Biphenyls (GC) by Method 8082M	WG1038835	1	11/04/17 11:47	11/06/17 14:01	JNS

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Linda Cashman
Technical Service Representative

Wet Chemistry by Method 9023

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Extracted TOX	ND		25.0	1	11/03/2017 11:35	WG1038641

Preparation by Method 1311

Analyte	Result	Qualifier	Prep date / time	Batch
TCLP Extraction	-		11/7/2017 7:00:27 AM	WG1039501
TCLP ZHE Extraction	-		11/7/2017 8:44:11 AM	WG1039822
Fluid	1		11/7/2017 7:00:27 AM	WG1039501
Initial pH	7		11/7/2017 7:00:27 AM	WG1039501
Final pH	5		11/7/2017 7:00:27 AM	WG1039501

Wet Chemistry by Method D93/1010A

Analyte	Result Deg. F	Qualifier	Dilution	Analysis date / time	Batch
Ignitability	DNI at 170		1	11/15/2017 01:54	WG1042266

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.0300	0.20	3	11/08/2017 12:12	WG1040252

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.100	5	1	11/08/2017 11:27	WG1040285
Barium	ND		0.100	100	1	11/08/2017 11:27	WG1040285
Cadmium	ND		0.100	1	1	11/08/2017 11:27	WG1040285
Chromium	ND		0.100	5	1	11/08/2017 11:27	WG1040285
Lead	ND		0.100	5	1	11/08/2017 11:27	WG1040285
Selenium	ND		0.100	1	1	11/08/2017 11:27	WG1040285
Silver	ND		0.100	5	1	11/08/2017 11:27	WG1040285

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.0500	0.50	1	11/08/2017 15:08	WG1040314
Carbon tetrachloride	ND		0.0500	0.50	1	11/08/2017 15:08	WG1040314
Chlorobenzene	ND		0.0500	100	1	11/08/2017 15:08	WG1040314
Chloroform	ND		0.250	6	1	11/08/2017 15:08	WG1040314
1,2-Dichloroethane	ND		0.0500	0.50	1	11/08/2017 15:08	WG1040314
1,1-Dichloroethene	ND		0.0500	0.70	1	11/08/2017 15:08	WG1040314
2-Butanone (MEK)	ND		0.500	200	1	11/08/2017 15:08	WG1040314
Tetrachloroethene	ND		0.0500	0.70	1	11/08/2017 15:08	WG1040314
Trichloroethene	ND		0.0500	0.50	1	11/08/2017 15:08	WG1040314
Vinyl chloride	ND		0.0500	0.20	1	11/08/2017 15:08	WG1040314
(S) Toluene-d8	*111*		*80.0-120*	*120*		*11/08/2017 15:08*	WG1040314
(S) Dibromofluoromethane	*101*		*76.0-123*	*123*		*11/08/2017 15:08*	WG1040314
(S) a,a,a-Trifluorotoluene	*105*		*80.0-120*	*120*		*11/08/2017 15:08*	WG1040314
(S) 4-Bromofluorobenzene	*112*		*80.0-120*	*120*		*11/08/2017 15:08*	WG1040314

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
1,4-Dichlorobenzene	ND		0.100	7.50	1	11/09/2017 17:09	WG1040566
2,4-Dinitrotoluene	ND		0.100	0.13	1	11/09/2017 17:09	WG1040566
Hexachlorobenzene	ND		0.100	0.13	1	11/09/2017 17:09	WG1040566
Hexachloro-1,3-butadiene	ND		1.00	0.50	10	11/13/2017 12:22	WG1040566
Hexachloroethane	ND		0.100	3	1	11/09/2017 17:09	WG1040566

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Nitrobenzene	ND		1.00	2	10	11/13/2017 12:22	WG1040566
Pyridine	ND		0.100	5	1	11/09/2017 17:09	WG1040566
3&4-Methyl Phenol	ND		0.100	400	1	11/09/2017 17:09	WG1040566
2-Methylphenol	ND		0.100	200	1	11/09/2017 17:09	WG1040566
Pentachlorophenol	ND		0.100	100	1	11/09/2017 17:09	WG1040566
2,4,5-Trichlorophenol	ND		0.100	400	1	11/09/2017 17:09	WG1040566
2,4,6-Trichlorophenol	ND		0.100	2	1	11/09/2017 17:09	WG1040566
(S) 2-Fluorophenol	*71.8*		*10.0-120*	*120*		*11/13/2017 12:22*	WG1040566
(S) 2-Fluorophenol	*75.1*		*10.0-120*	*120*		*11/09/2017 17:09*	WG1040566
(S) Phenol-d5	*56.4*		*10.0-120*	*120*		*11/13/2017 12:22*	WG1040566
(S) Phenol-d5	*58.5*		*10.0-120*	*120*		*11/09/2017 17:09*	WG1040566
(S) Nitrobenzene-d5	*64.3*		*10.0-126*	*126*		*11/13/2017 12:22*	WG1040566
(S) Nitrobenzene-d5	*22.9*		*10.0-126*	*126*		*11/09/2017 17:09*	WG1040566
(S) 2-Fluorobiphenyl	*97.1*		*22.0-127*	*127*		*11/13/2017 12:22*	WG1040566
(S) 2-Fluorobiphenyl	*106*		*22.0-127*	*127*		*11/09/2017 17:09*	WG1040566
(S) 2,4,6-Tribromophenol	*372*	J1	*10.0-153*	*153*		*11/13/2017 12:22*	WG1040566
(S) 2,4,6-Tribromophenol	*119*		*10.0-153*	*153*		*11/09/2017 17:09*	WG1040566
(S) p-Terphenyl-d14	*86.1*		*29.0-141*	*141*		*11/13/2017 12:22*	WG1040566
(S) p-Terphenyl-d14	*85.5*		*29.0-141*	*141*		*11/09/2017 17:09*	WG1040566

Sample Narrative:

L947909-02 WG1040566: IS/SURR failed on lower dilution.

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1016	ND		1.00	1	11/06/2017 12:16	WG1038835
PCB 1221	ND		1.00	1	11/06/2017 12:16	WG1038835
PCB 1232	ND		1.00	1	11/06/2017 12:16	WG1038835
PCB 1242	ND		1.00	1	11/06/2017 12:16	WG1038835
PCB 1248	ND		1.00	1	11/06/2017 12:16	WG1038835
PCB 1254	ND		1.00	1	11/06/2017 12:16	WG1038835
PCB 1260	ND		1.00	1	11/06/2017 12:16	WG1038835
(S) Decachlorobiphenyl	*49.6*	J2	*60.0-140*		*11/06/2017 12:16*	WG1038835
(S) Tetrachloro-m-xylene	*72.4*		*60.0-140*		*11/06/2017 12:16*	WG1038835

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1016	ND		1.00	1	11/06/2017 12:31	WG1038835
PCB 1221	ND		1.00	1	11/06/2017 12:31	WG1038835
PCB 1232	ND		1.00	1	11/06/2017 12:31	WG1038835
PCB 1242	ND		1.00	1	11/06/2017 12:31	WG1038835
PCB 1248	ND		1.00	1	11/06/2017 12:31	WG1038835
PCB 1254	ND		1.00	1	11/06/2017 12:31	WG1038835
PCB 1260	ND		1.00	1	11/06/2017 12:31	WG1038835
(S) Decachlorobiphenyl	*47.3*	J2	*60.0-140*		*11/06/2017 12:31*	WG1038835
(S) Tetrachloro-m-xylene	*79.0*		*60.0-140*		*11/06/2017 12:31*	WG1038835

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1016	ND		1.00	1	11/06/2017 12:46	WG1038835
PCB 1221	ND		1.00	1	11/06/2017 12:46	WG1038835
PCB 1232	ND		1.00	1	11/06/2017 12:46	WG1038835
PCB 1242	ND		1.00	1	11/06/2017 12:46	WG1038835
PCB 1248	ND		1.00	1	11/06/2017 12:46	WG1038835
PCB 1254	ND		1.00	1	11/06/2017 12:46	WG1038835
PCB 1260	ND		1.00	1	11/06/2017 12:46	WG1038835
(S) Decachlorobiphenyl	*43.3*	J2	*60.0-140*		*11/06/2017 12:46*	WG1038835
(S) Tetrachloro-m-xylene	*73.2*		*60.0-140*		*11/06/2017 12:46*	WG1038835

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1016	ND		1.00	1	11/06/2017 13:01	WG1038835
PCB 1221	ND		1.00	1	11/06/2017 13:01	WG1038835
PCB 1232	ND		1.00	1	11/06/2017 13:01	WG1038835
PCB 1242	ND		1.00	1	11/06/2017 13:01	WG1038835
PCB 1248	ND		1.00	1	11/06/2017 13:01	WG1038835
PCB 1254	ND		1.00	1	11/06/2017 13:01	WG1038835
PCB 1260	ND		1.00	1	11/06/2017 13:01	WG1038835
(S) Decachlorobiphenyl	*41.7*	J2	*60.0-140*		*11/06/2017 13:01*	WG1038835
(S) Tetrachloro-m-xylene	*80.1*		*60.0-140*		*11/06/2017 13:01*	WG1038835

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1016	ND		1.00	1	11/06/2017 13:16	WG1038835
PCB 1221	ND		1.00	1	11/06/2017 13:16	WG1038835
PCB 1232	ND		1.00	1	11/06/2017 13:16	WG1038835
PCB 1242	ND		1.00	1	11/06/2017 13:16	WG1038835
PCB 1248	ND		1.00	1	11/06/2017 13:16	WG1038835
PCB 1254	ND		1.00	1	11/06/2017 13:16	WG1038835
PCB 1260	ND		1.00	1	11/06/2017 13:16	WG1038835
(S) Decachlorobiphenyl	*38.8*	J2	*60.0-140*		*11/06/2017 13:16*	WG1038835
(S) Tetrachloro-m-xylene	*80.1*		*60.0-140*		*11/06/2017 13:16*	WG1038835

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1016	ND		1.00	1	11/06/2017 13:31	WG1038835
PCB 1221	ND		1.00	1	11/06/2017 13:31	WG1038835
PCB 1232	ND		1.00	1	11/06/2017 13:31	WG1038835
PCB 1242	ND		1.00	1	11/06/2017 13:31	WG1038835
PCB 1248	ND		1.00	1	11/06/2017 13:31	WG1038835
PCB 1254	ND		1.00	1	11/06/2017 13:31	WG1038835
PCB 1260	ND		1.00	1	11/06/2017 13:31	WG1038835
(S) Decachlorobiphenyl	*40.5*	J2	*60.0-140*		*11/06/2017 13:31*	WG1038835
(S) Tetrachloro-m-xylene	*86.6*		*60.0-140*		*11/06/2017 13:31*	WG1038835

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1016	ND		1.00	1	11/06/2017 13:46	WG1038835
PCB 1221	ND		1.00	1	11/06/2017 13:46	WG1038835
PCB 1232	ND		1.00	1	11/06/2017 13:46	WG1038835
PCB 1242	ND		1.00	1	11/06/2017 13:46	WG1038835
PCB 1248	ND		1.00	1	11/06/2017 13:46	WG1038835
PCB 1254	ND		1.00	1	11/06/2017 13:46	WG1038835
PCB 1260	ND		1.00	1	11/06/2017 13:46	WG1038835
(S) Decachlorobiphenyl	*64.3*		*60.0-140*		*11/06/2017 13:46*	WG1038835
(S) Tetrachloro-m-xylene	*89.7*		*60.0-140*		*11/06/2017 13:46*	WG1038835

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1016	ND		1.00	1	11/06/2017 14:01	WG1038835
PCB 1221	ND		1.00	1	11/06/2017 14:01	WG1038835
PCB 1232	ND		1.00	1	11/06/2017 14:01	WG1038835
PCB 1242	ND		1.00	1	11/06/2017 14:01	WG1038835
PCB 1248	ND		1.00	1	11/06/2017 14:01	WG1038835
PCB 1254	ND		1.00	1	11/06/2017 14:01	WG1038835
PCB 1260	ND		1.00	1	11/06/2017 14:01	WG1038835
(S) Decachlorobiphenyl	*37.3*	J2	*60.0-140*		*11/06/2017 14:01*	WG1038835
(S) Tetrachloro-m-xylene	*92.0*		*60.0-140*		*11/06/2017 14:01*	WG1038835

Method Blank (MB)

(MB) R3262955-1 11/03/17 10:05

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Extracted TOX	U		9.45	25.0

L947909-01 Original Sample (OS) • Duplicate (DUP)

(OS) L947909-01 11/03/17 11:35 • (DUP) R3262955-4 11/03/17 11:42

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/kg	mg/kg		%		%
Extracted TOX	ND	0.000	1	0		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3262955-2 11/03/17 10:16 • (LCSD) R3262955-3 11/03/17 10:24

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Extracted TOX	250	263	251	105	100	85-115			4	20

L947937-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947937-01 11/03/17 12:08 • (MS) R3262955-5 11/03/17 12:57 • (MSD) R3262955-6 11/03/17 13:06

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Extracted TOX	1000	135	1150	1250	101	112	1	80-120			9	20

L949784-02 Original Sample (OS) • Duplicate (DUP)

(OS) L949784-02 11/15/17 01:54 • (DUP) R3265594-3 11/15/17 01:54

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	Deg. F	Deg. F		%		%
Ignitability	DNI at 170	DNI at 170	1	0.000		10

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3265594-1 11/15/17 01:54 • (LCSD) R3265594-2 11/15/17 01:54

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	Deg. F	Deg. F	Deg. F	%	%	%			%	%
Ignitability	82.0	81.7	82.7	100	101	96.0-104			1.00	10

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3264070-1 11/08/17 11:31

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury	U		0.00333	0.0100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3264070-2 11/08/17 11:33 • (LCSD) R3264070-3 11/08/17 11:36

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Mercury	0.0300	0.0323	0.0294	108	98	80-120			9	20

L947733-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947733-01 11/08/17 11:38 • (MS) R3264070-4 11/08/17 11:40 • (MSD) R3264070-5 11/08/17 11:43

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.0300	0.0586	0.0845	0.0751	86	55	1	75-125		J6	12	20

Method Blank (MB)

(MB) R3263995-1 11/08/17 10:40

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Arsenic	U		0.0333	0.100
Barium	U		0.0333	0.100
Cadmium	U		0.0333	0.100
Chromium	U		0.0333	0.100
Lead	U		0.0333	0.100
Selenium	U		0.0333	0.100
Silver	U		0.0333	0.100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263995-2 11/08/17 10:42 • (LCSD) R3263995-3 11/08/17 10:45

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Arsenic	10.0	9.74	9.70	97	97	80-120			0	20
Barium	10.0	10.3	10.2	103	102	80-120			1	20
Cadmium	10.0	9.78	9.74	98	97	80-120			0	20
Chromium	10.0	9.79	9.78	98	98	80-120			0	20
Lead	10.0	9.88	9.84	99	98	80-120			0	20
Selenium	10.0	9.80	9.78	98	98	80-120			0	20
Silver	2.00	1.89	1.88	94	94	80-120			0	20

L947733-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947733-01 11/08/17 10:47 • (MS) R3263995-5 11/08/17 10:52 • (MSD) R3263995-6 11/08/17 10:55

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Arsenic	10.0	ND	10.0	10.1	100	100	1	75-125			1	20
Barium	10.0	ND	10.1	10.2	101	102	1	75-125			0	20
Cadmium	10.0	ND	9.92	9.94	99	99	1	75-125			0	20
Chromium	10.0	ND	9.68	9.77	97	98	1	75-125			1	20
Lead	10.0	ND	10.0	10.0	100	100	1	75-125			0	20
Selenium	10.0	ND	10.3	10.3	103	103	1	75-125			1	20
Silver	2.00	ND	1.90	1.91	95	95	1	75-125			1	20

Method Blank (MB)

(MB) R3264095-3 11/08/17 11:35

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Benzene	U		0.0167	0.0500
Carbon tetrachloride	U		0.0167	0.0500
Chlorobenzene	U		0.0167	0.0500
Chloroform	U		0.0833	0.250
1,2-Dichloroethane	U		0.0167	0.0500
1,1-Dichloroethene	U		0.0167	0.0500
2-Butanone (MEK)	U		0.167	0.500
Tetrachloroethene	U		0.0167	0.0500
Trichloroethene	U		0.0167	0.0500
Vinyl chloride	U		0.0167	0.0500
(S) Toluene-d8	*110*			*80.0-120*
(S) Dibromofluoromethane	*101*			*76.0-123*
(S) a,a,a-Trifluorotoluene	*106*			*80.0-120*
(S) 4-Bromofluorobenzene	*109*			*80.0-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3264095-1 11/08/17 09:55 • (LCSD) R3264095-2 11/08/17 10:14

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Benzene	0.0250	0.0248	0.0246	99.2	98.6	69.0-123			0.670	20
Carbon tetrachloride	0.0250	0.0204	0.0203	81.4	81.1	63.0-122			0.410	20
Chlorobenzene	0.0250	0.0263	0.0262	105	105	79.0-121			0.410	20
Chloroform	0.0250	0.0233	0.0231	93.2	92.3	72.0-121			0.970	20
1,2-Dichloroethane	0.0250	0.0254	0.0248	102	99.0	67.0-126			2.57	20
1,1-Dichloroethene	0.0250	0.0208	0.0204	83.2	81.6	64.0-129			1.99	20
2-Butanone (MEK)	0.125	0.172	0.170	138	136	37.0-158			1.37	20
Tetrachloroethene	0.0250	0.0261	0.0250	104	100	70.0-127			3.95	20
Trichloroethene	0.0250	0.0249	0.0250	99.5	100	78.0-120			0.490	20
Vinyl chloride	0.0250	0.0277	0.0278	111	111	64.0-133			0.320	20
(S) Toluene-d8				*110*	*108*	*80.0-120*				
(S) Dibromofluoromethane				*101*	*98.9*	*76.0-123*				
(S) a,a,a-Trifluorotoluene				*107*	*106*	*80.0-120*				
(S) 4-Bromofluorobenzene				*117*	*114*	*80.0-120*				

L947940-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947940-01 11/08/17 16:46 • (MS) R3264095-4 11/08/17 18:22 • (MSD) R3264095-5 11/08/17 18:41

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	1.25	ND	1.21	1.32	94.6	103	1	34.0-147			8.23	20
Carbon tetrachloride	1.25	ND	1.01	1.10	80.5	88.1	1	41.0-138			8.97	20
Chlorobenzene	1.25	ND	1.23	1.32	98.2	106	1	52.0-141			7.40	20
Chloroform	1.25	ND	1.12	1.22	89.6	97.3	1	50.0-139			8.27	20
1,2-Dichloroethane	1.25	ND	1.20	1.28	96.0	102	1	47.0-141			6.44	20
1,1-Dichloroethene	1.25	ND	0.957	1.18	76.6	94.7	1	31.0-148		J3	21.1	20
2-Butanone (MEK)	6.25	4.03	12.3	12.7	132	139	1	12.0-149			3.56	24
Tetrachloroethene	1.25	ND	1.21	1.34	96.5	107	1	38.0-147			10.7	20
Trichloroethene	1.25	ND	1.35	1.51	108	121	1	32.0-156			10.6	20
Vinyl chloride	1.25	ND	1.31	1.47	105	118	1	24.0-153			11.3	20
(S) Toluene-d8					*108*	*108*		*80.0-120*				
(S) Dibromofluoromethane					*101*	*101*		*76.0-123*				
(S) a,a,a-Trifluorotoluene					*105*	*106*		*80.0-120*				
(S) 4-Bromofluorobenzene					*117*	*118*		*80.0-120*				

Method Blank (MB)

(MB) R3263609-1 11/06/17 10:30

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
PCB 1260	U		0.330	1.00
PCB 1016	U		0.330	1.00
PCB 1221	U		0.330	1.00
PCB 1232	U		0.330	1.00
PCB 1242	U		0.330	1.00
PCB 1248	U		0.330	1.00
PCB 1254	U		0.330	1.00
(S) Decachlorobiphenyl	*102*			*60.0-140*
(S) Tetrachloro-m-xylene	*101*			*60.0-140*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263609-2 11/06/17 10:45 • (LCSD) R3263609-3 11/06/17 11:00

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
PCB 1260	1.00	1.13	1.06	113	106	60.0-140			6.56	20
PCB 1016	1.00	1.09	1.03	109	103	60.0-140			5.17	20
(S) Decachlorobiphenyl				*102*	*99.4*	*60.0-140*				
(S) Tetrachloro-m-xylene				*103*	*96.7*	*60.0-140*				

Method Blank (MB)

(MB) R3264369-3 11/09/17 11:12

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
1,4-Dichlorobenzene	U		0.0333	0.100
2,4-Dinitrotoluene	U		0.0333	0.100
Hexachlorobenzene	U		0.0333	0.100
Hexachloro-1,3-butadiene	U		0.0333	0.100
Hexachloroethane	U		0.0333	0.100
Nitrobenzene	U		0.0333	0.100
Pyridine	U		0.0333	0.100
2-Methylphenol	U		0.0333	0.100
3&4-Methyl Phenol	U		0.0333	0.100
Pentachlorophenol	U		0.0333	0.100
2,4,5-Trichlorophenol	U		0.0333	0.100
2,4,6-Trichlorophenol	U		0.0333	0.100
(S) Nitrobenzene-d5	*67.7*			*10.0-126*
(S) 2-Fluorobiphenyl	*79.1*			*22.0-127*
(S) p-Terphenyl-d14	*70.1*			*29.0-141*
(S) Phenol-d5	*45.0*			*10.0-120*
(S) 2-Fluorophenol	*61.2*			*10.0-120*
(S) 2,4,6-Tribromophenol	*76.3*			*10.0-153*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3264369-1 11/09/17 10:01 • (LCSD) R3264369-2 11/09/17 10:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,4-Dichlorobenzene	0.0500	0.0333	0.0328	66.5	65.7	26.0-120			1.23	30
2,4-Dinitrotoluene	0.0500	0.0467	0.0480	93.3	96.0	47.0-127			2.80	21
Hexachlorobenzene	0.0500	0.0394	0.0405	78.9	81.0	41.0-124			2.68	21
Hexachloro-1,3-butadiene	0.0500	0.0286	0.0308	57.1	61.6	26.0-120			7.48	31
Hexachloroethane	0.0500	0.0314	0.0338	62.9	67.5	22.0-120			7.15	34
Nitrobenzene	0.0500	0.0338	0.0332	67.7	66.4	31.0-120			1.87	28
Pyridine	0.0500	0.0149	0.0208	29.8	41.5	10.0-120			32.8	39
2-Methylphenol	0.0500	0.0351	0.0350	70.1	70.0	26.0-120			0.250	27
3&4-Methyl Phenol	0.0500	0.0383	0.0419	76.6	83.7	27.0-120			8.95	28
Pentachlorophenol	0.0500	0.0353	0.0341	70.5	68.1	20.0-126			3.49	32
2,4,5-Trichlorophenol	0.0500	0.0405	0.0413	80.9	82.7	44.0-124			2.16	24
2,4,6-Trichlorophenol	0.0500	0.0402	0.0415	80.4	82.9	40.0-122			3.03	24
(S) Nitrobenzene-d5				*66.3*	*68.0*	*10.0-126*				
(S) 2-Fluorobiphenyl				*76.6*	*81.8*	*22.0-127*				
(S) p-Terphenyl-d14				*65.9*	*69.0*	*29.0-141*				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3264369-1 11/09/17 10:01 • (LCSD) R3264369-2 11/09/17 10:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) Phenol-d5				*46.7*	*57.1*	*10.0-120*				
(S) 2-Fluorophenol				*62.5*	*67.8*	*10.0-120*				
(S) 2,4,6-Tribromophenol				*82.6*	*84.3*	*10.0-153*				

L947772-13 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947772-13 11/09/17 13:58 • (MS) R3264369-4 11/09/17 14:22 • (MSD) R3264369-5 11/09/17 14:46

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
1,4-Dichlorobenzene	0.500	ND	0.346	0.327	69.2	65.4	1	12.0-125			5.75	23
2,4-Dinitrotoluene	0.500	ND	0.499	0.483	99.7	96.6	1	30.0-156			3.22	29
Hexachlorobenzene	0.500	ND	0.431	0.404	86.3	80.8	1	29.0-144			6.57	33
Hexachloro-1,3-butadiene	0.500	ND	0.303	0.292	60.7	58.4	1	18.0-122			3.88	35
Hexachloroethane	0.500	ND	0.335	0.318	67.1	63.5	1	12.0-120			5.50	36
Nitrobenzene	0.500	ND	0.361	0.340	72.1	68.0	1	14.0-134			5.80	32
Pyridine	0.500	ND	0.193	0.184	38.6	36.8	1	10.0-120			4.82	40
2-Methylphenol	0.500	ND	0.377	0.360	75.4	72.0	1	14.0-120			4.61	29
3&4-Methyl Phenol	0.500	ND	0.422	0.389	84.4	77.8	1	13.0-124			8.15	26
Pentachlorophenol	0.500	ND	0.412	0.390	82.4	78.0	1	10.0-160			5.54	40
2,4,5-Trichlorophenol	0.500	ND	0.444	0.418	88.8	83.6	1	15.0-160			5.96	27
2,4,6-Trichlorophenol	0.500	ND	0.434	0.414	86.8	82.9	1	10.0-153			4.65	29
(S) Nitrobenzene-d5					*73.5*	*65.9*		*10.0-126*				
(S) 2-Fluorobiphenyl					*86.2*	*84.4*		*22.0-127*				
(S) p-Terphenyl-d14					*70.9*	*66.3*		*29.0-141*				
(S) Phenol-d5					*47.3*	*45.4*		*10.0-120*				
(S) 2-Fluorophenol					*65.0*	*62.5*		*10.0-120*				
(S) 2,4,6-Tribromophenol					*90.0*	*84.3*		*10.0-153*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

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***** Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

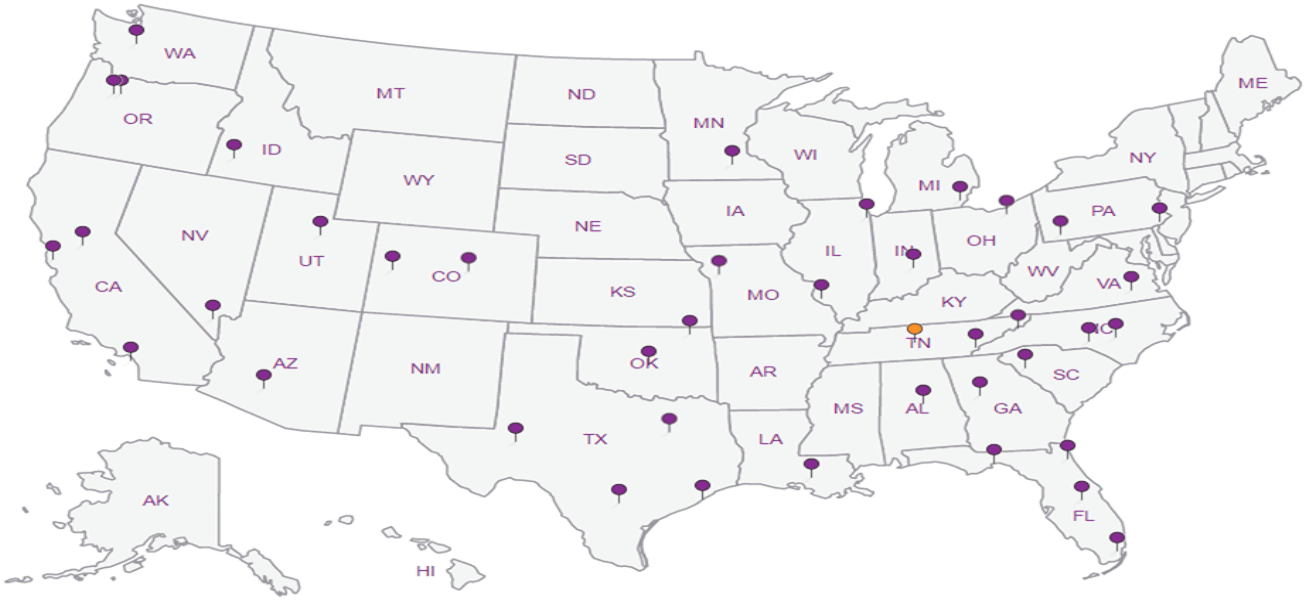
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

[1.] Drinking Water [2.] Underground Storage Tanks [3.] Aquatic Toxicity [4.] Chemical/Microbiological [5.] Mold [n/a] Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



Company Name/Address:
BAE Systems - Holston Army Ammunition
4509 W. Stone Drive
Kingsport, TN 37660

Billing Information:
Attn: Accounts Payable
4509 West Stone Drive
Kingsport, TN 37660

Report to: [redacted]

Email To: SAmos

Project Description: BLDG 156 Waste oil

City/State Collected: KPT-TN

Phone: [redacted]
Fax:

Client Project #

Lab Project #

Collected by (print): [redacted]

Site/Facility ID #

P.O. # JAG-08-0110-01

Collected by (signature):

Immediately Packed on Ice N ___ Y ___

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day ASAP 50%
___ Three Day 25%

Date Results Needed: 11/3/17 ASAP

Email? ___No ___Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L947464

Table E014

Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	TCLP metals, TCLP VOC, TCLP SVOC, TOX, IGNITABILITY	PCBs	Rem./Contaminant	Sample # (lab only)
DRUMS 1-8	Comp	OT		11/1/17	9:30am	1	X			-01
DRUM #1	GRAB	OT		11/1/17	8:30am	1		X		03
Drum #2	GRAB	OT		11/1/17	8:40am	1		X		04
Drum #3	GRAB	OT		11/1/17	8:45am	1		X		05
Drum #4	GRAB	OT		11/1/17	8:50am	1		X		06
Drum #5	GRAB	OT		11/1/17	8:55am	1		X		07
Drum #6	GRAB	OT		11/1/17	9:00am	1		X		08
Drum #7	GRAB	OT		11/1/17	9:05am	1		X		09
Drum #8	GRAB	OT		11/1/17	9:10am	1		X		10

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other OIL

Remarks: CAS:

pH ___ Temp ___
Flow ___ Other ___

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
[redacted]	11/1/17	1545	[redacted]
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
[redacted]			[redacted]
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)
[redacted]			[redacted]

Samples returned via: ☐ UPS ☐ FedEx ☑ Courier ☐ ____
Temp: 0.8 °C Bottles Received: 9
Date: 11/2/17 Time: 8:45

Condition: (lab use only) OK
COC Seal Intact: ___ Y ___ N ___ NA
pH Checked: NCF:

ESC LAB SCIENCES
Cooler Receipt Form

Client: BAESYSKTN	SDG#	L947909	
Cooler Received/Opened On: 11/2/17	Temperature:	0.8	
Received by : Christian Kacar			
Signature:			

Receipt Check List	NP	Yes	No
COC Seal Present / Intact?			
COC Signed / Accurate?			
Bottles arrive intact?			
Correct bottles used?			
Sufficient volume sent?			
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

September 17, 2018

Appendix J 1-3 Oil Waste Disposal Sample

(See also: Appendix J2 - G4 Oil)

BAE Systems-Holston Army Ammunition

Sample Delivery Group:	L1025013
Samples Received:	09/12/2018
Project Number:	
Description:	Building I-3 Oil

Report To: [redacted]

4509 West Stone Drive

Kingsport, TN 37660

Entire Report Reviewed By:

Linda Cashman

Linda Cashman
Project Manager

TABLE OF CONTENTS

I-3 OIL L1025013-01 Solid

Collected by	Collected date/time	Received date/time
Daniel Reed	09/10/18 14:00	09/12/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG1166361	1	09/14/18 12:48	09/16/18 10:40	EL
Metals (ICP) by Method 6010B	WG1165640	1	09/13/18 12:41	09/14/18 13:22	TRB
Polychlorinated Biphenyls (GC) by Method 8082	WG1166670	7.35	09/15/18 16:48	09/16/18 19:02	RP

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Linda Cashman
Project Manager

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	09/16/2018 10:40	WG1166361

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	ND		2.00	1	09/14/2018 13:22	WG1165640
Barium	ND		0.500	1	09/14/2018 13:22	WG1165640
Cadmium	ND		0.500	1	09/14/2018 13:22	WG1165640
Chromium	ND		1.00	1	09/14/2018 13:22	WG1165640
Lead	ND		0.500	1	09/14/2018 13:22	WG1165640
Selenium	ND		2.00	1	09/14/2018 13:22	WG1165640
Silver	ND		1.00	1	09/14/2018 13:22	WG1165640

Polychlorinated Biphenyls (GC) by Method 8082

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1016	ND		0.125	7.35	09/16/2018 19:02	WG1166670
PCB 1221	ND		0.125	7.35	09/16/2018 19:02	WG1166670
PCB 1232	ND		0.125	7.35	09/16/2018 19:02	WG1166670
PCB 1242	ND		0.125	7.35	09/16/2018 19:02	WG1166670
PCB 1248	ND		0.125	7.35	09/16/2018 19:02	WG1166670
PCB 1254	ND		0.125	7.35	09/16/2018 19:02	WG1166670
PCB 1260	ND		0.125	7.35	09/16/2018 19:02	WG1166670
(S) Decachlorobiphenyl	*62.2*		*10.0-135*		*09/16/2018 19:02*	WG1166670
(S) Tetrachloro-m-xylene	*81.2*		*10.0-139*		*09/16/2018 19:02*	WG1166670

Sample Narrative:

L1025013-01 WG1166670: Dilution due to matrix impact during extraction procedure

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3342301-1 09/16/18 09:39

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Mercury	U		0.00280	0.0200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3342301-2 09/16/18 09:42 • (LCSD) R3342301-3 09/16/18 09:44

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Mercury	0.300	0.271	0.257	90.4	85.5	80.0-120			5.55	20

L1024894-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1024894-09 09/16/18 09:47 • (MS) R3342301-4 09/16/18 09:49 • (MSD) R3342301-5 09/16/18 09:52

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.300	0.0106	0.242	0.231	77.2	73.6	1	75.0-125		J6	4.58	20

Method Blank (MB)

(MB) R3342132-1 09/14/18 13:00

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.460	2.00
Barium	U		0.170	0.500
Cadmium	U		0.0700	0.500
Chromium	U		0.140	1.00
Lead	U		0.190	0.500
Selenium	U		0.620	2.00
Silver	U		0.120	1.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3342132-2 09/14/18 13:03 • (LCSD) R3342132-3 09/14/18 13:05

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	100	98.3	96.3	98.3	96.3	80.0-120			2.05	20
Barium	100	102	101	102	101	80.0-120			1.09	20
Cadmium	100	99.6	98.3	99.6	98.3	80.0-120			1.35	20
Chromium	100	101	99.5	101	99.5	80.0-120			1.80	20
Lead	100	99.4	98.3	99.4	98.3	80.0-120			1.13	20
Selenium	100	101	100	101	100	80.0-120			0.615	20
Silver	20.0	19.2	18.8	95.8	93.9	80.0-120			2.04	20

L1025166-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025166-05 09/14/18 13:07 • (MS) R3342132-6 09/14/18 13:15 • (MSD) R3342132-7 09/14/18 13:17

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	100	5.27	95.6	95.9	90.4	90.6	1	75.0-125			0.251	20
Barium	100	250	307	325	57.2	75.0	1	75.0-125	J6		5.61	20
Cadmium	100	0.245	94.6	94.3	94.4	94.0	1	75.0-125			0.399	20
Chromium	100	50.6	140	141	89.7	89.9	1	75.0-125			0.193	20
Lead	100	28.9	121	120	92.5	91.2	1	75.0-125			1.10	20
Selenium	100	0.702	94.0	94.8	93.3	94.1	1	75.0-125			0.766	20
Silver	20.0	U	17.6	17.4	88.1	87.2	1	75.0-125			1.05	20

Method Blank (MB)

(MB) R3342382-1 09/16/18 08:31

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
PCB 1016	U		0.00350	0.0170
PCB 1221	U		0.00537	0.0170
PCB 1232	U		0.00417	0.0170
PCB 1242	U		0.00318	0.0170
PCB 1248	U		0.00315	0.0170
PCB 1254	U		0.00472	0.0170
PCB 1260	U		0.00494	0.0170
(S) Decachlorobiphenyl	*67.3*			*10.0-135*
(S) Tetrachloro-m-xylene	*72.1*			*10.0-139*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3342382-2 09/16/18 09:12 • (LCSD) R3342382-3 09/16/18 09:26

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
PCB 1260	0.167	0.110	0.102	65.9	61.1	37.0-145			7.55	37
PCB 1016	0.167	0.127	0.118	76.0	70.7	36.0-141			7.35	35
(S) Decachlorobiphenyl				*72.5*	*65.3*	*10.0-135*				
(S) Tetrachloro-m-xylene				*79.0*	*74.0*	*10.0-139*				

L1025083-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025083-01 09/16/18 19:16 • (MS) R3342382-4 09/16/18 19:30 • (MSD) R3342382-5 09/16/18 19:43

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
PCB 1260	0.197	U	0.142	0.143	71.9	72.5	1	10.0-160			0.830	38
PCB 1016	0.197	U	0.156	0.162	79.0	82.0	1	10.0-160			3.72	37
(S) Decachlorobiphenyl					*77.9*	*91.3*		*10.0-135*				
(S) Tetrachloro-m-xylene					*77.2*	*90.8*		*10.0-139*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

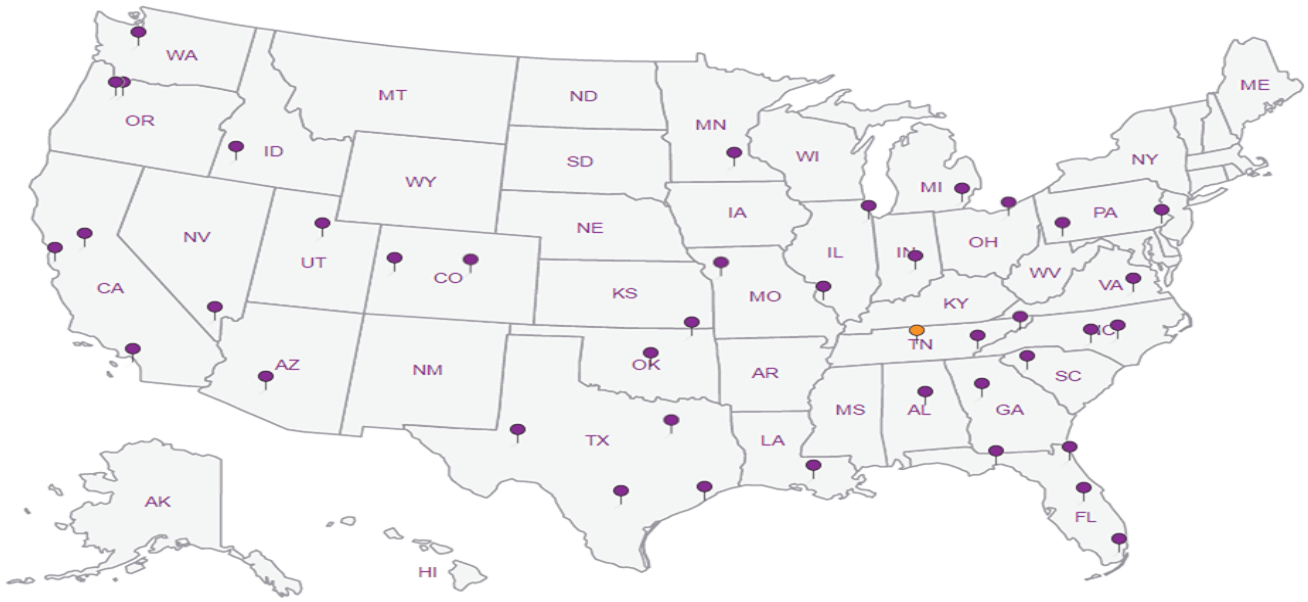
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



L1025013

BAE Systems - Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, TN 37660

Billing Information:

Report to: [redacted]

Email to: [redacted]

Project Description: Building I-3 Oil

City/State Collected: Kingsport, TN

Phone: [redacted]
FAX:

Client Project #:

ESC Key:

Collected by: [redacted]

Site/Facility ID#:

P.O.#: JAE-080110-01

Collected by (signature):

Immediately Packed on Ice N Y

Rush? (Lab MUST Be Notified)
____ Same Day..... 200%
____ Next Day..... 100%
____ Two Day..... 50%
____ Three Day..... 25%

Date Results Needed:

Email? __No ✓Yes
FAX? __No __Yes

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	Analysis/Container/Preservative: PCBs, RCRA Metals	Remarks/Contaminant	Sample # (lab only)
I-3 oil	Grab	WW		9/10/18	2:00pm	1	x		01
						1			
						1			
						1			
						1			
						1			
						1			
						1			
						1			

Chain of Custody
Page 1 of 1

ESC LAB SCIENCES
12065 Lebanon Road
Mt. Juliet, TN 37122
Phone: (800) 767-5859
Phone: (615) 758-5858
Fax: (615) 758-5859
A201

CoCode (lab use only)
Template/Prelogin
Shipped Via:

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other _____ pH _____ Temp _____

Remarks: RAD SCREEN: <0.5 mR/hr #7827 3496 9324 Flow _____ Other _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☑ FedEx ☐ Courier ☐ _____	Condition: (lab use only)
Rick Smith	9-9-18	1300	Greg Burkhardt		✓
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 1.0 °C	Bottles Received: 1 - B
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 9/12/18	Time: 0845

CoC Seals Intact: ~~X~~ Y ___ N ___ NA

pH Checked: NCF: NCS

Pace Analytical National Center for Testing & Innovation
Cooler Receipt Form

Client: BHESYSFIN	SDG#	1025013
Cooler Received/Opened On: 09/ 12/18	Temperature:	1.0
Received By: Keteishia Cameron		
Signature: KCameron		

Receipt Check List	NP	Yes	No
COC Seal Present / Intact?		/	
COC Signed / Accurate?		/	
Bottles arrive intact?		/	
Correct bottles used?		/	
Sufficient volume sent?		/	
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

February 03, 2020

Appendix J2 - G4 Oil

BAE Systems-Holston Army Ammunition

Sample Delivery Group:	L1183020
Samples Received:	01/25/2020
Project Number:	
Description:	G4 Oil

Report To: [redacted]

4509 West Stone Drive

Kingsport, TN 37660

Entire Report Reviewed By:

Stacy Kennedy

Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

TABLE OF CONTENTS

G-4 OIL L1183020-01 Solid

Collected by: Rick Smith
Collected date/time: 01/24/20 09:00
Received date/time: 01/25/20 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9076	WG1418945	5	01/29/20 14:23	01/29/20 14:23	VRP	Mt. Juliet, TN
Mercury by Method 7471A	WG1419066	1	01/29/20 13:04	01/29/20 20:51	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1418363	1	01/29/20 09:48	01/30/20 19:58	CCE	Mt. Juliet, TN
Polychlorinated Biphenyls (GC) by Method 8082M	WG1418709	1	01/29/20 06:52	01/29/20 11:06	MTJ	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Stacy Kennedy
Project Manager

Wet Chemistry by Method 9076

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TOX	ND	J5	100	5	01/29/2020 14:23	WG1418945

Sample Narrative:

L1183020-01 WG1418945: Dilution Due to Matrix.

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0300	1	01/29/2020 20:51	WG1419066

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	ND		2.00	1	01/30/2020 19:58	WG1418363
Barium	1.21		0.500	1	01/30/2020 19:58	WG1418363
Cadmium	ND		0.500	1	01/30/2020 19:58	WG1418363
Chromium	ND		1.00	1	01/30/2020 19:58	WG1418363
Lead	ND		0.500	1	01/30/2020 19:58	WG1418363
Selenium	ND		2.00	1	01/30/2020 19:58	WG1418363
Silver	ND		1.00	1	01/30/2020 19:58	WG1418363

Polychlorinated Biphenyls (GC) by Method 8082M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
PCB 1016	ND		1.00	1	01/29/2020 11:06	WG1418709
PCB 1221	ND		1.00	1	01/29/2020 11:06	WG1418709
PCB 1232	ND		1.00	1	01/29/2020 11:06	WG1418709
PCB 1242	ND		1.00	1	01/29/2020 11:06	WG1418709
PCB 1248	ND		1.00	1	01/29/2020 11:06	WG1418709
PCB 1254	ND		1.00	1	01/29/2020 11:06	WG1418709
PCB 1260	ND		1.00	1	01/29/2020 11:06	WG1418709
(S) Decachlorobiphenyl	*63.5*		*60.0-140*		*01/29/2020 11:06*	WG1418709
(S) Tetrachloro-m-xylene	*79.0*		*60.0-140*		*01/29/2020 11:06*	WG1418709

Method Blank (MB)

(MB) R3495150-1 01/29/20 13:19

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
TOX	U		7.88	20.0

L1182201-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1182201-01 01/29/20 14:10 • (DUP) R3495150-3 01/29/20 14:17

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/kg	mg/kg		%		%
TOX	ND	0.000	5	0.000		10

Sample Narrative:
OS: Dilution Due to Matrix.

Laboratory Control Sample (LCS)

(LCS) R3495150-2 01/29/20 13:32

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/kg	mg/kg	%	%	
TOX	100	111	111	85.0-115	

L1183020-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1183020-01 01/29/20 14:23 • (MS) R3495150-4 01/29/20 14:30 • (MSD) R3495150-5 01/29/20 14:36

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
TOX	33.3	ND	197	211	118	126	5	80.0-120		J5	7.04	20

Sample Narrative:
OS: Dilution Due to Matrix.

Method Blank (MB)

(MB) R3495266-1 01/29/20 20:35

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Mercury	U		0.00280	0.0300

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3495266-2 01/29/20 20:38 • (LCSD) R3495266-3 01/29/20 20:40

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Mercury	0.500	0.475	0.488	95.0	97.5	80.0-120			2.62	20

L1183628-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1183628-02 01/29/20 20:43 • (MS) R3495266-4 01/29/20 20:46 • (MSD) R3495266-5 01/29/20 20:48

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.500	0.0346	0.467	0.491	86.5	91.3	1	75.0-125			5.08	20

Method Blank (MB)

(MB) R3495685-1 01/30/20 19:24

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Arsenic	U		0.460	2.00
Barium	U		0.170	0.500
Cadmium	U		0.0700	0.500
Chromium	U		0.140	1.00
Lead	U		0.190	0.500
Selenium	U		0.620	2.00
Silver	U		0.120	1.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3495685-2 01/30/20 19:27 • (LCSD) R3495685-3 01/30/20 19:29

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Arsenic	100	82.5	86.8	82.5	86.8	80.0-120			5.16	20
Barium	100	88.1	92.8	88.1	92.8	80.0-120			5.14	20
Cadmium	100	84.6	88.8	84.6	88.8	80.0-120			4.83	20
Chromium	100	84.1	88.8	84.1	88.8	80.0-120			5.44	20
Lead	100	83.7	87.7	83.7	87.7	80.0-120			4.63	20
Selenium	100	84.3	88.6	84.3	88.6	80.0-120			5.01	20
Silver	20.0	16.7	17.5	83.6	87.4	80.0-120			4.41	20

L1182990-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1182990-01 01/30/20 19:32 • (MS) R3495685-6 01/30/20 19:40 • (MSD) R3495685-7 01/30/20 19:42

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Arsenic	100	5.40	89.7	96.5	84.3	91.1	1	75.0-125			7.30	20
Barium	100	124	194	203	69.6	78.9	1	75.0-125	J6		4.66	20
Cadmium	100	ND	88.3	94.0	88.0	93.7	1	75.0-125			6.17	20
Chromium	100	18.9	98.6	107	79.7	88.4	1	75.0-125			8.49	20
Lead	100	17.0	106	144	89.5	127	1	75.0-125		J3 J5	30.0	20
Selenium	100	ND	85.7	92.7	85.7	92.7	1	75.0-125			7.88	20
Silver	20.0	ND	17.2	18.5	85.8	92.5	1	75.0-125			7.51	20

Method Blank (MB)

(MB) R3495039-1 01/29/20 10:24

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
PCB 1260	U		0.330	1.00
PCB 1016	U		0.330	1.00
PCB 1221	U		0.330	1.00
PCB 1232	U		0.330	1.00
PCB 1242	U		0.330	1.00
PCB 1248	U		0.330	1.00
PCB 1254	U		0.330	1.00
(S) Decachlorobiphenyl	*125*			*60.0-140*
(S) Tetrachloro-m-xylene	*110*			*60.0-140*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3495039-2 01/29/20 10:38 • (LCSD) R3495039-3 01/29/20 10:52

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
PCB 1260	1.00	1.39	1.37	139	137	60.0-140			1.45	20
PCB 1016	1.00	1.25	1.28	125	128	60.0-140			2.37	20
(S) Decachlorobiphenyl				*121*	*118*	*60.0-140*				
(S) Tetrachloro-m-xylene				*107*	*105*	*60.0-140*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

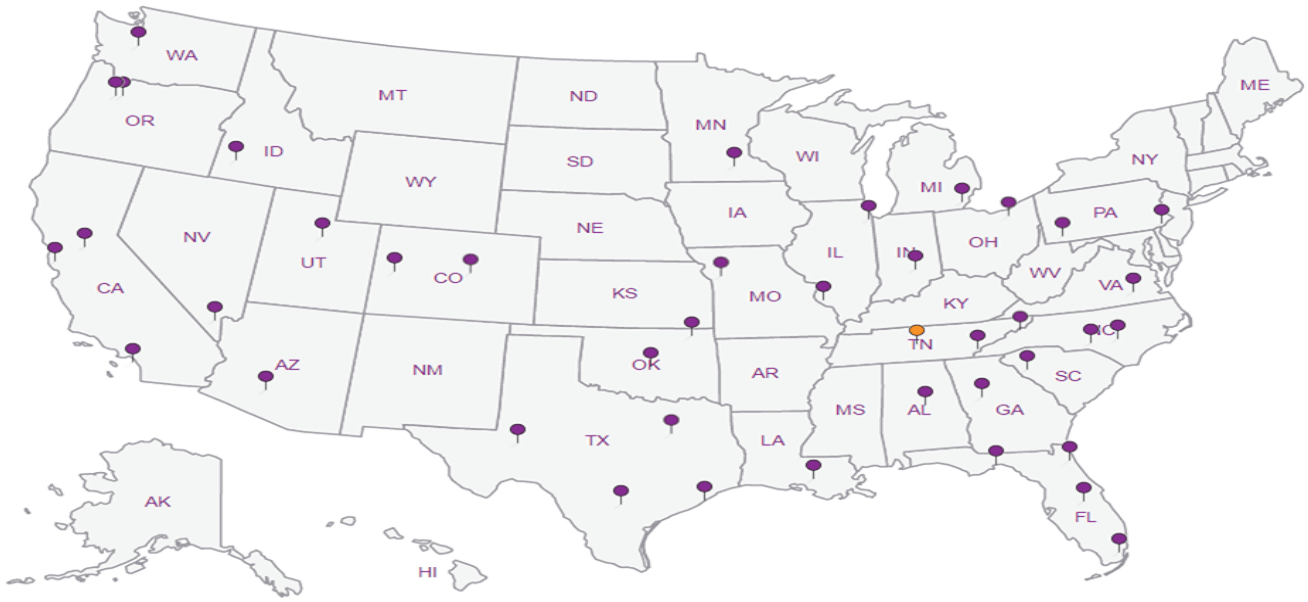
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



BAE Systems - Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, TN 37660

Billing Information:

Report to: [redacted]

Email to: [redacted]

Project Description: G4 Oil

City/Sate Collected: Kingsport, TN

Phone: [redacted]
FAX:

Client Project #:

ESC Key:

Collected by: [redacted]

Site/Facility ID#:

P.O.#: JAE-~~0801100.01~~ 100118-01

Collected by (signature): RSH

Immediately Packed on Ice N Y

Rush? (Lab MUST Be Notified)
____ Same Day.....200%
____ Next Day.....100%
____ Two Day.....50%
____ Three Day.....25%

Date Results Needed:
Email? __No ✓Yes
FAX? __No __Yes

Analysis/Container/Preservative

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	PCBs	Total Halogens	Metals	Remarks/Contaminant	Sample # (lab only)
G-4 Oil	Grab	WW		1/24/202(	9am	2	x	x	x		-01

Chain of Custody
Page 1 of 1

ESC LAB SCIENCES
12065 Lebanon Road
Mt. Juliet, TN 37122
Phone: (800) 767-5859
Phone: (615) 758-5858
Fax: (615) 758-5859

L1183020

CoCode (lab use only)
Template/Prelogin
Shipped V
A075

*Matrix: **SS** - Soil/Solid **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other _____

pH _____ Temp _____

Remarks: 1 SAMPLE IN TWO CONTAINERS, CAN BE COMBINED IF NEEDED

Flow _____ Other _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☒ Courier ☐ _____	Condition: (lab use only)
RSH	1-24-20	1135	T Kelly		
T Kelly	1-24-20	1700	CROSSTOWN	Temp: 3+.4=.7 AM / Bottles Received:	RAD SCREEN: <0.5 mR/hr CoC Seals Intact: ___Y ___N ___NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 1-25-20 / Time: 0800	pH Checked: / NCF:

NS

A.J. - 2

(NO TRIP)

Pace Analytical National Center for Testing & Innovation
Cooler Receipt Form

Client:	L1183020	
Cooler Received/Opened On: 1/25/20 Temperature:	0.7	
Received By: Monte Smith		
Signature: Monte Smith		

Receipt Check List	NP	Yes	No
COC Seal Present / Intact?		✓	
COC Signed / Accurate?		✓	
Bottles arrive intact?		✓	
Correct bottles used?		✓	
Sufficient volume sent?		✓	
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			

Troy Dunlap

Pace Analytical®
National Center for Testing & Innovation

Login #: L1183020	Client: BAESYSKTN	Date: 01/25/20	Evaluated by:

Non-Conformance (check applicable items)

	Sample Integrity		Chain of Custody Clarification		
	Parameter(s) past holding time		Login Clarification Needed		**If Broken Container:**
	Temperature not in range		Chain of custody is incomplete		Insufficient packing material around container
	Improper container type	x	Please specify Metals requested.		Insufficient packing material inside cooler
	pH not in range.		Please specify TCLP requested.		Improper handling by carrier (FedEx / UPS / Couri
	Insufficient sample volume.		Received additional samples not listed on coc.		Sample was frozen
	Sample is biphasic.		Sample ids on containers do not match ids on coc		Container lid not intact
	Vials received with headspace.		Trip Blank not received.		**If no Chain of Custody:**
	Broken container		Client did not "X" analysis.		Received by:
	Broken container:		Chain of Custody is missing		Date/Time:
	Sufficient sample remains				Temp./Cont. Rec./pH:
					Carrier:
					Tracking#

Login Comments:

Please specify what metals to test for.

Client informed by:		Call	X	Email		Voice Mail		Date: 1/27/20	Time: 08:59
TSR Initials: SK	Client Contact: Daniel Reed								

Login Instructions:

RCRA8 via ICP

Appendix H - Holston Area MW Data Summary Table 2015-2019

Holston Army Ammunition Plant
Area A Monitoring Wells
Data Sumamry Sheet - April 2015 through October 2019

MW Name →			MW-104	MW-105	MW-106	MW-107	MW-107 FD	MW-104	MW-105	MW-105 FD	MW-106	MW-107	MW-104	MW-105	MW-106	MW-107	MW-107 FD	MW-104	MW-105	MW-105 FD	MW-106	MW-107	MW-104	MW-105	MW-106	MW-107	MW-107 FD	MW-104	MW-105	MW-106	MW-107	MW-107 FD	MW-104	MW-105	MW-106	MW-107	MW-107 FD	MW-104	MW-105	MW-106	MW-107	MW-107 FD
Sample Collection Date →			2-May-15	2-May-15	2-May-15	2-May-15	2-May-15	8-Oct-15	8-Oct-15	8-Oct-15	8-Oct-15	8-Oct-15	2-May-16	2-May-16	2-May-16	2-May-16	2-May-16	25-Oct-16	25-Oct-16	25-Oct-16	25-Oct-16	25-Oct-16	8-Apr-17	8-Apr-17	8-Apr-17	8-Apr-17	8-Apr-17	17-Oct-17	17-Oct-17	17-Oct-17	17-Oct-17	17-Oct-17	1-Apr-18	1-Apr-18	1-Apr-18	1-Apr-18	1-Apr-18	17-Oct-18	17-Oct-18	17-Oct-18	17-Oct-18	17-Oct-18	24-Mar-19	24-Mar-19	24-Mar-19	24-Mar-19	24-Mar-19	16-Oct-19	16-Oct-19	16-Oct-19	16-Oct-19	16-Oct-19
CAO Target Analytes ↓	GWPS ↓	Screening Criteria ↓																																								
Naphthalene	238	0.14 (RSL)	0.012U	0.012U	0.012U	0.012U	NA	**0.11**	**0.012J**	**0.013J**	**0.047J**	**0.033J**	0.011U	0.012U	0.011U	0.013U	NA	0.012U	0.012U	NA	0.012U	0.012U	0.012U	0.012U	0.012U	NA	0.012U	0.012U	0.012U	0.012U	NA	0.012U	0.0054U	0.0078U	0.0061U	NA	0.012U	**0.009J**	0.012U	0.012U	NA	0.012U	0.012U	0.012U	0.012U	NA	0.012U	0.012UJ	0.013U	0.013U	NA
Benzene	8500	5 (MCL)	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U	0.4U
Methylene Chloride	8500	5 (MCL)	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.78U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	0.8U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U	2.0U

NOTES
All results are in micrograms per Liter
J: Concentration listed is an estimated value
U: Analyte not detected
UJ: Analyte not detected, listed concentration is an estimated value
FD: Field Duplicate Sample
NA: Not Analyzed
BOLD: Analyte detected at listed concentration
GWPS: Groundwater Protection Standard, used only for Boundary Wells. All Area A Monitoring Wells are Boundary Wells
MCL: Maximum Contaminant level - from the Safe Drinking Water Act
RSL: U.S. EPA Regional Screening Level
CAO: Corrective Action Order

Appendix F2 - Enterprise Oil

NON-HAZARDOUS MATERIAL MANIFEST

BAES00

Manifest Number 437448

GENERAL INFORMATION

Company BAE Systems Phone #

Address 4509 W Stone Dr Zip Code

City Kingsport, TN Ship Point

Contact Person Title

EPA #

CERTIFICATION: This is to certify that the below named waste materials are properly marked, labeled, classified, packaged and described and in proper condition for transportation in accordance with the applicable regulations of the Department of Transportation.

Generator Signature X Thomas Stanley for Becky Birchfield Title Date 10/7/15

INFORMATION

Description 1 used A-F 3 used O-F

Shipped In: ☐ Bulk ☒ Drums Quantity (est.) (actual) 4

Shipped As: ☐ Liquid ☐ Sludge ☐ Solid

TRANSPORTATION INFORMATION

Company **Enterprise Oil Co.** Phone # **865-558-0533**

Address **5201 N. Middlebrook** City **Knoxville** State **TN** Zip **37921**

Truck Tanker # Driver

Date & Time of Pick-Up Delivery

CERTIFICATION: This is to certify that the above named waste materials were picked-up from the above named Generator and the transportation portion of this manifest is correctly filled out to the best of my knowledge.

Driver Signature

DISPOSER INFORMATION

Company **Enterprise Oil Co.** Phone # **865-558-0533**

Address **5201 N. Middlebrook** City **Knoxville** State **TN** Zip **37921**

EPA ID# **TND987780145**

CERTIFICATION: This is to certify that the above named waste material has been received and accepted for disposal in a manner pursuant to all Federal, State and County or Municipal regulations and guidelines to the best of my knowledge.

P.O# JAE-020818-01

NON-HAZARDOUS MATERIAL MANIFEST

Manifest Number 459816

GENERAL INFORMATION

Company BAE Systems Phone # _____
Address 4509 W Stone Dr Zip Code _____
City Kingsport, TN Ship Point _____
Contact Person _____ Title _____
EPA # _____

CERTIFICATION: This is to certify that the below named waste materials are properly marked, labeled, classified, packaged and described and in proper condition for transportation in accordance with the applicable regulations of the Department of Transportation.

Generator Signature [signature] Title _____ Date 2/22/18

INFORMATION

Description used O-F
Shipped In: ❒ Bulk ☒ Drums Quantity (est.) _____ (actual) 3
Shipped As: ❒ Liquid ❒ Sludge ❒ Solid

TRANSPORTATION INFORMATION

Company **Enterprise Oil Co.** Phone # **865-558-0533**
Address **5201 N. Middlebrook** City **Knoxville** State **TN** Zip **37921**
Truck _____ Tanker # _____ Driver _____
Date & Time of Pick-Up _____ Delivery _____

CERTIFICATION: This is to certify that the above named waste materials were picked-up from the above named Generator and the transportation portion of this manifest is correctly filled out to the best of my knowledge.

Driver Signature [signature]

DISPOSER INFORMATION

Company **Enterprise Oil Co.** Phone # **865-558-0533**
Address **5201 N. Middlebrook** City **Knoxville** State **TN** Zip **37921**
EPA ID# **TND987780145**

CERTIFICATION: This is to certify that the above named waste material has been received and accepted for disposal in a manner pursuant to all Federal, State and County or Municipal regulations and guidelines to the best of my knowledge.

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No. 121019TMH-1

2. Page 1 of

3. Generator's Name and Mailing Address: Holston Army Ammunition Plant 4509 W Stone Dr. Kingsport Tn 37660

4. Generator's Phone ( )

5. Transporter 1 Company Name: Enterprise Oil

6. US EPA ID Number

A. State Transorter's ID

B. Transporter 1 Phone

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address: Enterprise Oil 5201 Middlebrook Pk Knoxville Tn 37921

10. US EPA ID Number

E. State Facility's ID

F. Facility's Phone

11. WASTE DESCRIPTION	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.
a. 7-Drums Non-Hazmat Waste	06	Drums	06	Lbs
b.				
c.				
d.				

G. Additonal Descriptions for Materials Listed Above

3 drums Oil only
3 drums Filters

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

GENERATOR

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: * DeWayne Stacy

Signature: * DeWayne Stacy

Date: Month 12 Day 10 Year 19

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: JD Hill

Signature

Date: Month 12 Day 10 Year 19

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator; Certification of receipt of the waste materials covered by this maifest, except as noted in item 19.

Printed/Typed Name: Amy Gettelfinger

Signature: Amy Gettelfinger

Date: Month 12 Day 12 Year 19

NON-HAZARDOUS WASTE

Rev. 3/95

NON-HAZARDOUS MATERIAL MANIFEST

Manifest Number 459692

GENERAL INFORMATION

Company BAE Systems Phone # _____

Address 4509 Weststone Dr Zip Code _____

City Kingsport TN. Ship Point _____

Contact Person _____ Title _____

EPA # _____

CERTIFICATION: This is to certify that the below named waste materials are properly marked, labeled, classified, packaged and described and in proper condition for transportation in accordance with the applicable regulations of the Department of Transportation.

Generator Signature _____ Title _____ Date 2 Dec 18

INFORMATION

Description Used Oil

Shipped In: ☐ Bulk ☐ Drums Quantity (est.) 1325 (actual) 1325

Shipped As: ☒ Liquid ☐ Sludge ☐ Solid

TRANSPORTATION INFORMATION

Company **Enterprise Oil Co.** Phone # **865-558-0533**

Address **5201 N. Middlebrook** City **Knoxville** State **TN** Zip **37921**

Truck 3869 Tanker # _____ Driver _____

Date & Time of Pick-Up _____ Delivery _____

CERTIFICATION: This is to certify that the above named waste materials were picked-up from the above named Generator and the transportation portion of this manifest is correctly filled out to the best of my knowledge.

Driver Signature _____

DISPOSER INFORMATION

Company **Enterprise Oil Co.** Phone # **865-558-0533**

Address **5201 N. Middlebrook** City **Knoxville** State **TN** Zip **37921**

EPA ID# **TND987780145**

CERTIFICATION: This is to certify that the above named waste material has been received and accepted for disposal in a manner pursuant to all Federal, State and County or Municipal regulations and guidelines to the best of my knowledge.

NON-HAZARDOUS MATERIAL MANIFEST

Manifest Number 457593

GENERAL INFORMATION

Company Bae Systems Phone # _____

Address 4509 West Stone Dr Zip Code _____

City Kingsport TN Ship Point _____

Contact Person _____ Title _____

EPA # _____

CERTIFICATION: This is to certify that the below named waste materials are properly marked, labeled, classified, packaged and described and in proper condition for transportation in accordance with the applicable regulations of the Department of Transportation.

Generator Signature x [signature] Title x Operator Date 6/26/18

INFORMATION

Description Pick up 5 "55 Gallon Drums

Shipped In: ❒ Bulk ❒ Drums Quantity (est.) _____ (actual) _____

Shipped As: ❒ Liquid ❒ Sludge ❒ Solid

TRANSPORTATION INFORMATION

Company **Enterprise Oil Co.** Phone # **865-558-0533**

Address **5201 N. Middlebrook** City **Knoxville** State **TN** Zip **37921**

Truck 8389 Tanker # _____ Driver EM

Date & Time of Pick-Up 11:48 - 12:35 6-26-18 Delivery _____

CERTIFICATION: This is to certify that the above named waste materials were picked-up from the above named Generator and the transportation portion of this manifest is correctly filled out to the best of my knowledge.

Driver Signature [signature]

DISPOSER INFORMATION

Company **Enterprise Oil Co.** Phone # **865-558-0533**

Address **5201 N. Middlebrook** City **Knoxville** State **TN** Zip **37921**

EPA ID# **TND987780145**

CERTIFICATION: This is to certify that the above named waste material has been received and accepted for disposal in a manner pursuant to all Federal, State and County or Municipal regulations and guidelines to the best of my knowledge.

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of

3. Generator's Name and Mailing Address

BAE SYSTEMS

4509 West Stone Dr Kingsport TN

4. Generator's Phone ( )

5. Transporter 1 Company Name: ENTERPRISE OIL

6. US EPA ID Number: TND987780145

A. State Transporter's ID: TND987780145

B. Transporter 1 Phone

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address

10. US EPA ID Number: TND987780145

E. State Facility's ID

F. Facility's Phone: 865-558-0533

11. WASTE DESCRIPTION	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON-HAZARDOUS NON-REGULATED LIQUID	5	DM	275	G
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

GENERATOR

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: X Cody Frazier

Signature: X

Date: Month 3 Day 26 Year 18

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Steven Cox

Signature

Date: Month 3 Day 26 Year 18

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator; Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name: Crystal Hilliard

Signature: Crystal Hilliard

Date: Month 3 Day 27 Year 18

NON-HAZARDOUS WASTE

Rev. 3/95

Enterprise Oil

MANIFEST NUMBER: 478459

NON-HAZARDOUS MATERIAL MANIFEST

BAE500

GENERAL INFORMATION

Company: BAE Systems
Contact Person: Daniel Reed
Address: 4509 W Stone
EPA #:
City/State/Zip: Kingsport TN
Ship Point:
Phone #: 423 493-3761
Generator Signature: [signature] Title: [illegible] Date: 10-8-19

CERTIFICATION:
This is to certify that the below named waste materials are properly marked, labeled, classified, packaged, and described and in proper condition for transportation in accordance with the applicable regulations of the Department of Transportation.

INFORMATION

	BULK	DRUM	QTY	Notes
OIL:	✓		1330	(50-)
ANTI-FREEZE:				
FILTERS:				
WATER:				
NHS:				

TRANSPORTATION INFORMATION

Company: Enterprise Oil Co.
Truck / Tanker # 8869
Address: 5201 N. Middlebrook
Driver
City/State/Zip: Knoxville, TN 37921
Pickup Date/ Time
Phone #: 865-558-0533
Delivery
Driver Signature: [signature]

CHARGED OCT 09 2019

CERTIFICATION:
This is to certify that the above named waste materials were picked up from the above named Generator and the transportation portion of this manifest is correctly filled out to the best of my knowledge.

DISPOSER INFORMATION

Company: Enterprise Oil Co.
Address: 5201 N. Middlebrook
City/State/Zip: Knoxville, TN 37921
Phone #: 865-558-0533
EPA ID # TND987780145

CERTIFICATION:
This is to certify that the above named waste material has been received and accepted for disposal in a manner pursuant to all Federal, State, and County or Municipal regulations and guidelines to the best of my knowledge.

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No. 5614

2. Page 1 of

3. Generator's Name and Mailing Address BAE System Kingsport TN

WT# 15-00010-12

4. Generator's Phone ( )

5. Transporter 1 Company Name: Enterprise Oil

6. US EPA ID Number: TND987780145

A. State Transporter's ID

B. Transporter 1 Phone

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address: Enterprise Oil Knoxville TN

10. US EPA ID Number: TND987780145

E. State Facility's ID

F. Facility's Phone

GENERATOR

11. WASTE DESCRIPTION	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.
a. Non Regulated Solids	01	UT	500	G
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

Paul Bailey - 423-578-8010

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Paul Bailey — Signature — Date: Month 5 Day 12 Year 15

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Greg Hall — Signature — Date: Month 5 Day 12 Year 15

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator; Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name: Amy Gettefinger — Signature — Date: Month 5 Day 12 Year 15