



## Attachment D

# Thermal Desorption Operations

# Thermal Desorption Operations

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**Revision 0**

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## 1. PURPOSE AND SCOPE

### 1.1. Purpose

This procedure provides a description of the operations associated with the Vacuum Assisted Thermal Desorption System (VTD).

### 1.2. Scope

This procedure applies to EnergySolutions and TD\*X Associates personnel. All VTD operations shall be conducted in the Mixed Waste Storage Building and all shredding of material shall be conducted in the Mixed Waste Treatment Building, at EnergySolutions' Clive Facility. EnergySolutions shall provide the required manifesting documentation to allow TD\*X to fulfill its permit requirements.

**NOTE:** This procedure is not written to address TD\*X's responsibilities for the TSCA permit requirements issued for the equipment (unit).

## 2. REFERENCES

- 2.1. 29 CFR 1910.106, *Flammable and Combustible Liquids*
- 2.2. State Issued Part B Permit, Attachment II-1-2, *Waste Analysis Plan for Treatment Wastes*
- 2.3 DAQE-AN0717015-06, *Air Approval Order*
- 2.4 State Issued Part B Permit, Attachment II-4, *Personnel Training Plan*
- 2.5 ES-SH-PR-201, *Control of Hot Work*
- 2.6 ES-SH-PR-200, *Industrial Hygiene Program*
- 2.7 ES-SH-PR-107, *Confined Spaces*
- 2.8 CL-MT-WI-305, *Tertiary Shredder Operation*
- 2.9 CL-MD-PR-002, *EnergySolutions Generated Waste*
- 2.10 CL-LB-PR-011, *Sample Control – Chain of Custody Procedure*
- 2.11 CL-RS-PR-200, *Radiological Surveys*
- 2.12 High Performance Thermal Desorption Unit Mobile Prototype Integrated Operating Manual
- 2.13 Letter to Tye Rogers from the DRC, dated 05/20/05
- 2.14 Letter to Boyd Imai from Joe Heckman, dated 04/08/05

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**Thermal Desorption Operations**

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- 2.15 CL-MT-PR-101-F1, *Over-Packing Operation Record*
- 2.16 Radioactive Material License No. UT2300249
- 2.17 CL-RS-PR-113, *Radiological Control of Effluent for VTD Process*
- 2.18 CL-MT-PR-502, *Thermal Desorption Waste Sampling*

**3. GENERAL****3.1. Definitions**

- 3.1.1. *Vacuum Assisted Thermal Desorption (VTD)* - A process that produces a physical separation of organic chemicals from contaminated soil waste materials.
- 3.1.2. *Condensate* - A treatment bi-product collected through the VTD separation process that consists of aqueous and non-aqueous organic constituents and water.
- 3.1.3. *Process Run* - The Thermal Desorption activities for any one waste stream during one calendar day of operation.
- 3.1.4. *Process Cycle (Batch)* - One cycle which includes adding feed material, treating the material using a specified formula, and discharging the treatment residue into the product container.
- 3.1.5. *Feed Material* - The waste and other materials that are introduced into the VTD system.
- 3.1.6. *Product Container* - Container positioned at the discharge of the conveyor to collect a batch of material.

**3.2. Responsibilities**

- 3.2.1. **Director of Mixed Waste Operations** has overall responsible for providing the necessary waste management support for VTD Operations.
- 3.2.2. **Project Coordinator** is responsible for overseeing the Thermal Desorption project to the extent of ensuring that the project is completed in compliance with this procedure and State and Federal regulations.
- 3.2.3. **Environmental Engineer** is responsible for reviewing and approving analytical results ensuring compliance with EnergySolutions' Licenses and Permits.
- 3.2.4. **Director of Health Physics** is responsible for performing ALARA review of process to include radiation safety requirements in the Radiation Work Permit (RWP). Additionally the Director of Health Physics is responsible to

perform RAD and SNM calculations as stated in Section 4.1.1 of this procedure.

- 3.2.5. **TD\*X Associates/VTD Operators** is a vendor of *EnergySolutions* and responsible for providing and maintaining the VTD system equipment; and performing the actual operations of the equipment; including plans, procedures, and reports.
- 3.2.6. **Lab Manager** is responsible for qualifying personnel collecting samples and validating data from off-site Laboratories.
- 3.2.7. **Treatment Operator** is responsible for preprocessing waste for VTD operations.
- 3.2.8. **Industrial Hygienist** is responsible for assessing CO alarms and determining when it is safe to return to work. In addition, to evaluate potentially hazardous atmospheres and specification of appropriate PPE/Respiratory Protection.

### 3.3. Precautions and Limitations

- 3.3.1. Operators shall comply with the Radiation Work Permit (RWP).
- 3.3.2. A minimum of two VTD Operators shall be present at all times during VTD Operations. The foreman or lead for the operation shall be a qualified VTD operator.
- 3.3.3. A Hot Work Permit shall be obtained before performing hot work on the VTD system or in the storage building in accordance with Reference 2.5, Control of Hot Work.
- 3.3.4. When facility carbon monoxide monitors or personal monitoring devices alarm at set levels during shredding or VTD operations, immediately exit work area. If the alarm is caused by equipment, such as lift trucks or generator, personnel may reenter the building after the alarm turns off. If the alarm is caused by the VTD system, or an unknown cause, personnel must obtain approval from the Industrial Hygienist prior to reentering the building. Monitoring shall be done in accordance with Reference 2.6, Industrial Hygiene Program.
- 3.3.5. Storage of flammable liquid (flash point < 100 degrees F), which includes condensate, stored in the Storage Building or Treatment Building shall not exceed 110 gallons. An additional 110 gallons may be stored in a flammable cabinet in either building. Total shall not exceed 220 gallons in each building.
- 3.3.6. Flammable liquids shall be stored and handled in accordance with Reference 2.1, Flammable and Combustible Liquids and the International Fire Code upon receipt of analytical data indicating a closed cup flash point below 100

degrees F. Applicable condensate storage containers shall be clearly marked with the word "Flammable".

- 3.3.7. Entry into a confined space shall be performed in accordance with Reference 2.7, Confined Spaces.
- 3.3.8. Additional safety requirements may be identified in Reference 2.12, High Performance Thermal Desorption Unit Mobile Prototype Integrated Operating Manual and other vendor procedures.

#### 3.4. Document Control and Records

- 3.4.1. Attachment 5.1, Thermal Desorption Treatment Record, and Reference 2.15, Over-Packing Operation Record, shall be transmitted to Document Control by the Mixed Waste Administrative Assistant within 90 days of completion.

### 4. REQUIREMENTS AND GUIDANCE

#### 4.1. Compliance

- 4.1.1. Radiological classification and SNM determinations shall be completed prior to treatment of each shipment through Thermal Desorption, in accordance with Reference 2.17, Radiological Control of Effluent for VTD Process.
  - a. As per a letter to Tye Rogers from the DRC, dated 5/20/05, and a letter to Boyd Imai from Joe Heckman, dated 04/08/05, calculations shall be performed to determine the SNM concentrations of treatment residue prior to treating the waste. Additionally, samples of the residue may be required at the Director of Health Physics's discretion.
- 4.1.2. Feed material classified as a DOT Oxidizer shall not be processed through the VTD unit. Feed material with a pH less than four or greater than twelve shall not be processed through the VTD Unit.
- 4.1.3. Feed material contain mercury at concentrations above the Universal Treatment Standards applicable for the waste (e.g., 0.025 mg/L or 0.2 mg/L) shall not be processed through the VTD unit.
  - a. Amalgamation and stabilization may be performed prior to VTD processing in order to meet these requirements.

**NOTE:** pH adjustment may be performed, prior to transfer to the VTD Unit. Loading different pH material into the VTD unit can occur as long as the average pH is between four and twelve, per batch.

- 4.1.4. The Clive site is located in an attainment area of the National Ambient Air Quality Standards (NAAQS) for all pollutants. New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP) and Maximum Available Control Technology

(MACT) regulations do not apply to this source or the VTD unit. Title V of the Clean Air Act does not apply to this source.

- 4.1.5. RAD effluent air sampling is required during VTD treatment in accordance with Reference 2.16, Radioactive Material License. If effluent air sampling cannot be performed as required, VTD shall be shut down.

#### 4.2. General

- 4.2.1. Only qualified TD\*X personnel shall operate the VTD Treatment Unit.
- 4.2.2. All personnel collecting samples shall be trained by the Lab Manager or designee, prior to performing any sampling of feed material, batch material, or condensate.
- 4.2.3. All material being processed shall be sized to less than 4 inches in any one direction, prior to loading into the VTD Unit.

#### 4.3. Process

- 4.3.1. Waste preprocessing by *EnergySolutions* Treatment Operator(s).
  - a. Visually inspect contents of the containers for VTD for material that is greater than 4 inches. Material greater than 4 inches shall be sized to less than 4 inches if the waste is being processed through VTD.
  - b. Perform a test strip pH analysis (if needed) and record on Attachment 5.2, Checklist Label.
  - c. When sizing of the flammable waste is required, sizing shall be performed using the Tertiary Shredder in accordance with Reference 2.8, Tertiary Shredder Operation.
  - d. Waste considered PCB/Radioactive or PCB/Mixed may be sorted, but shall not be size reduced at the Clive facility.

**NOTE:** The Organic Filtered Dust collector and fire suppression system shall be in place and functioning during shredding operations.

- e. When a different drum is used from the container the waste came in; the generator or *EnergySolutions* container number(s) and the *EnergySolutions* label information shall be transferred to the new drum, and documented on Over-Packing Operation Record, Reference 2.15
  - f. After each container is pre-processed, attach the checklist label and complete the checklist.
- 4.3.2. VTD Operations



- a. Ensure that the RAD effluent air sampling is being conducted prior to feeding each batch.

**Note:** If at any time during VTD treatment it is noticed that the air sampling ceased, the VTD unit shall be safely shut down.

- b. Perform Thermal Desorption Treatment as specified in Reference 2.12, High Performance Thermal Desorption Unit Mobile Prototype Integrated Operating Manual.
- c. Document the Thermal Desorption Treatment on Attachment 5.1, Thermal Desorption Treatment Record.
- d. Containerize and label the solid treatment residue. Labels shall be obtained from EnergySolutions Personnel. Containers shall be strong tight.

- (1) Label the container with at least the following information

- The words "Hazardous Waste"
- Generator, Waste Stream and run number (i.e. 9008-22-030325)
- Process Cycle (Batch) Letter
- Reactive Group Number's (if applicable)
- Date of treatment
- The status Awaiting Lab (AL)
- PCB Label (if applicable)

4.3.3. The Project Coordinator shall direct sampling by qualified personnel if sampling is needed, in accordance with Reference 2.18, Thermal Desorption Waste Sampling. Additional samples may be collected as determined by the Environmental Engineer and/or the Director of Health Physics.

- a. Sample custody shall be maintained in accordance with Reference 2.10, Chain of Custody Procedure. The sample shall be delivered to the Chemical Laboratory. Preserve samples in accordance with SW-846 sampling methods.
- b. The solid treatment residue shall be sampled by a qualified sampler after the box is removed from the VTD Unit if required for post treatment analysis.

4.3.4. EnergySolutions Operations

- a. All Chemical analytical results shall be reviewed by the Environmental Engineer to determine compliance with treatment standards and approval of waste for further management.
- b. When the post-treatment samples fail to meet applicable treatments standard treated by VTD, then waste shall be retreated as necessary. If the post-treatment samples meet applicable treatments standards, waste may be managed for disposal or additional treatment, as needed, for other hazardous constituents.


**NOTE:** Stabilization Treatability studies shall be performed, in accordance with Reference 2.2, *Waste Analysis Plan for Treatment Wastes* and treated in accordance with existing Standard Operating Procedures.

- c. Radiological Contamination Surveys may be performed in locations after the filter to determine filter efficiency in accordance with Reference 2.11, Radiological Surveys.
- d. Condensate shall be managed in accordance with Reference 2.9, *EnergySolutions* Generated Waste.
- e. Attachment 5.1, Thermal Desorption Treatment Record shall be completed then reviewed and signed by a TDX Supervisor/Manager or designee.
- f. Attachment 5.1, Thermal Desorption Treatment Record and Reference 2.15, Over-Packing Operation Record, shall be forwarded to the Project Coordinator daily for review of accuracy, completion, and legibility.
- g. The reviewed Thermal Desorption Treatment Record (Attachment 5.1) and the Over-Packing Operation Record (Reference 2.15) shall be forwarded to the Mixed Waste Administrative Assistant who will transmit it to document control in accordance with step 3.4 of this procedure.

## 5. ATTACHMENTS AND FORMS

- 5.1. Thermal Desorption Treatment Record, CL-MT-PR-501-F1 (EC98300) – Example
- 5.2. VTD Checklist Label - Example

**ATTACHMENT 5.1**  
**Thermal Desorption Treatment Record – Example**

	Thermal Desorption Treatment Record (EC-98300) Form CL-MT-PR-501-F1 Rev. 0
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**Thermal Desorption Treatment Record**

Recipe ID: \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

Gen.- W.S. - Run Number \_\_\_\_\_

Process Cycle (batch) ID: \_\_\_\_\_ Start Date/Time: \_\_\_\_\_ End Date/Time: \_\_\_\_\_

Containers In / Feed Material					
Bates/Run #	Container Type	Container Number	Bates/Run #	Container Type	Container Number
1.			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		
Containers Out / Process Material			Notes:		
Net Weight (lbs)	Final Temp. Hold Time	Cycle Time (min.)			

Process Cycle (batch) ID: \_\_\_\_\_ Start Date/Time: \_\_\_\_\_ End Date/Time: \_\_\_\_\_

Containers In / Feed Material					
Bates/Run #	Container Type	Container Number	Bates/Run #	Container Type	Container Number
1.			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		
Containers Out / Process Material			Notes:		
Net Weight (lbs)	Final Temp. Hold Time	Cycle Time (min.)			

\_\_\_\_\_  
Lead TD Operator Print / Sign / Date\_\_\_\_\_  
TD Manager Print / Sign / Date\_\_\_\_\_  
EnergySolutions Review Initial / Date

ATTACHMENT 5.3

VTD Checklist Label

Container ID \_\_\_\_\_

Gen Id/WS \_\_\_\_\_ Bates No. \_\_\_\_\_

1. Soil/Solid pH (N/A if debris) \_\_\_\_\_

2. Material less than 4 in. Y N

3. Was Material Sized? Y N

4. Drum inspected to meet strong tight. Y N

Comments: \_\_\_\_\_

Initial \_\_\_\_\_ Date \_\_\_\_\_