

ATTACHMENT II-1-12-1

THERMAL DESORPTION SHAKEDOWN OPERATIONS AND WASTE FAMILY
DEMONSTRATION TESTING

1. PURPOSE AND SCOPE

- a. This Attachment outlines the requirements necessary to perform initial start-up operations, Functional Testing, Shakedown Operations, and Waste Family Demonstration Testing for the Thermal Desorption (TD) system.
- b. The requirements of this Attachment shall be completed for the initial establishment of the TD unit.
- c. When adding new equipment to the TD unit, the requirements of Section 7 shall be completed. However, the requirements of Section 7 will not be necessary if a piece of equipment is replaced by an equivalent as approved by the Director.
- d. The Waste Family Demonstration Testing requirements of this Attachment and Section 4 of Attachment II-1-12, *Thermal Desorption Separation Plan*, shall be completed whenever a new waste family is introduced as feed material into the TD unit.
 - i. The results of these tests shall be used to determine the operating parameters of the TD unit and shall be used to update the requirements of Attachment II-1-12, *Thermal Desorption Separation Plan*, and Attachment II-1-12-2 *Waste Family Operational Parameters*, as necessary.
- e. Definitions of terms used within this Attachment are found in Attachment II-1-12, *Thermal Desorption Separation Plan*.

2. OPERATIONAL PLAN

- a. Prior to TD operation, the system shall undergo all of the testing requirements of this Attachment, including Functional Testing, Shakedown Operations, and Waste Family Demonstration Testing.
- b. Functional Testing, as described in Section 3, is required prior to Waste Family Demonstration Testing. The results of the Functional Testing shall be documented in the Pre-Demonstration Plan (PDP).
- c. Shakedown Operations, as described in Section 4, if performed, shall be documented in the PDP.

- d. At a minimum, a PDP shall contain the following:
 - i. a detailed description of the system and all equipment, including any additional features that have been added or changed since previous tests;
 - ii. a review of results from previous tests;
 - iii. a description of any feed material used during the tests;
 - iv. preliminary operating parameters;
 - v. Data Quality Objectives (DQOs) and analytical verification testing to achieve the DQOs;
 - vi. a Sampling and Analysis Plan;
 - vii. quality assurance/quality control (QA/QC) measures for operational testing and analytical data;
 - viii. expected secondary waste streams and by-products and a discussion of their final disposition;
 - ix. an outline of the testing;
 - x. the Permittee's (and contractor's, if applicable) key personnel for the testing, by position, and a list of emergency coordinators; and
 - xi. other requirements as described in Conditions 2.b., 2.c., 2.e., 3.e.i., 3.e.iv., 3.f., 4.g., 5.c., 5.e., 5.f., 6.a., 6.c., 6.d., 6.f.i., 6.f.ii., 6.g., and 6.h.
- e. Upon completion of each phase of the testing (e.g., Functional Testing or Shakedown Testing), a preliminary report shall be submitted to the Director. These preliminary reports shall contain all required analytical data and process information. The data and information required for each phase shall be detailed in the PDP.
- f. A comprehensive Post-Waste Family Demonstration Report shall be prepared within 90 calendar days of the completion of the Waste Family Demonstration Testing unless an extension is granted in writing by the Director. This report shall contain, at a minimum:
 - i. any operational deviations from the PDP for that Waste Family Demonstration Testing, and justifications for the deviations;

- ii. a declaration that the data confirm that the TD unit is either capable of treating the tested waste family or that Waste Family Demonstration Testing was unsuccessful;
- iii. all testing results, as defined in the PDP for that Waste Family Demonstration Testing, and commentary on the results;
- iv. a comparison of the testing results to the DQOs;
- v. operating parameters for the TD unit; and
- vi. lessons learned during the testing processes.

3. FUNCTIONAL TESTING

- a. Functional Testing shall be performed during initial establishment of the TD unit and whenever new equipment is added. However, Functional Testing will not be required if a piece of equipment is replaced by an equivalent as approved by the Director.
- b. Functional Testing shall be completed prior to feed material being processed through the TD unit.
- c. Functional Testing shall be comprised of the following tests:
 - i. An Equipment Test, wherein each component of the TD unit is operated independently to verify proper equipment function. All equipment shall be verified operational prior to the System Demonstration Test.
 - ii. A Systems Demonstration Test in which the entire TD unit is operated with non-contaminated feed material.
 - iii. An Automatic Waste Feed Cut-Off (AWFCO) system functional test, if applicable, to verify that the AWFCO is functioning properly.
- d. All process monitoring equipment shall be calibrated in accordance with manufacturer's specifications prior to the Systems Demonstration Test. A copy of the manufacturer's manuals and specifications for all process monitoring equipment shall be submitted to the Director prior to the Systems Demonstration Test.
- e. A Systems Demonstration Test shall be performed prior to the introduction of contaminated feed material into the TD unit. The Systems Demonstration Test shall be performed as follows:

- i. A volume of clean fill soil shall be processed through the TD unit. The minimum volume shall be designated in the PDP for that Demonstration Test.
 - ii. Clean fill soil may be obtained from non-contaminated excavations at the Clive site or purchased from a suitable off-site source.
 - iii. The clean fill soil shall be screened, as necessary, to eliminate feed material greater than four inches in size.
 - iv. A number of treatment runs shall be completed. The minimum number of treatment runs shall be designated in the PDP for that Demonstration Test.
 - v. Verification of all components and subsystems, by a qualified TD operator, shall be completed prior to TD unit operations using contaminated feed material.
- f. The objective of the Systems Demonstration Test shall be clearly defined within the PDP. In general, the Systems Demonstration Test shall be used to verify successful TD equipment operation.
- g. All aspects of Functional Testing, including the Systems Demonstration Test, shall be documented in the Post-Waste Family Demonstration Report in which the testing was completed.

4. SHAKEDOWN OPERATIONS

- a. After Functional Testing and Systems Demonstration Test have been completed the Permittee shall request approval to conduct Shakedown Operations. Director approval shall be required prior to beginning initial Shakedown Operations.
- b. Shakedown Operations shall be defined as a maximum of 360 hours of operation.
- c. The Permittee may request up to three additional 360 hour periods of shakedown if necessary. The Permittee shall not proceed with additional shakedown periods without Director approval.
- d. Shakedown Operations shall be completed to obtain preliminary operating parameters to be used during Waste Family Demonstration Testing.
- e. Shakedown Operations shall be completed to obtain successful maximum feed rates.
- f. Shakedown Operations shall be completed using contaminated feed material.

- g. Specifications for preliminary Shakedown Operations and initial operating conditions shall be defined and justified in the PDP.
- h. Sampling and analysis of the processed material from Shakedown Operations shall be used to establish TD operating parameters for each waste family within the time constraints identified in Conditions 4.b. and 4.c.
- i. Within the Shakedown Operations, a Pre-Test shall be performed when required in the PDP to establish equivalent Removal Efficiencies (RE) for Principal Organic Hazardous Constituents (POHCs) and known contaminants in the waste within the TD unit.
- j. The Pre-Test shall consist of the following:
 - i. a determination of representative POHCs;
 - ii. the spiking of feed material with the chosen POHC(s), as necessary;
 - iii. the sampling of feed material as it is loaded into the TD unit;
 - iv. the analysis of feed material samples for POHC concentration(s);
 - v. the analysis of feed material for hazardous constituents
 - vi. the processing of feed material through the TD unit;
 - vii. the sampling of process vent emission;
 - viii. the analysis of the process vent emission sample for POHC concentration(s);
 - ix. the combination of feed material and process vent emission analytical results with the mass flow rates of the streams to calculate a RE through the TD unit; and
 - x. the analysis of the condensate.
- k. Calculated data from the Pre-Test shall be submitted to the Director for review and approval as required by Condition 2.f The calculated data shall verify that a POHC RE of at least 99.99% was achieved or that a POHC RE was not attained.
- l. If a POHC RE of 99.99% is not attained within the time constraints identified in Condition 4.b. and 4.c., one of the following options shall be employed:
 - i. The failing POHC shall be rejected and the PDP relating to this POHC shall be adjusted to disallow TD operations for separation of the POHC

and other compounds represented by the POHC. A report shall be submitted to the Director detailing the failure.

- ii. Upon written request by the Permittee, the Director may approve a RE for a known contaminant in the waste less than 99.99%. The Permittee shall demonstrate through a Risk Assessment why a RE of less than 99.99% is justified.

5. WASTE FAMILY DEMONSTRATION TESTING

- a. Waste Family Demonstration Testing shall consist of at least three treatment runs based on the preliminary operating parameters established during Shakedown Operations or previous permitted operations.
- b. A schedule, complete with dates, times, tests (APC or Operational) and organization charts (emission contractor, Permittee personnel, TD contractor personnel, etc.), shall be submitted to the Director at least 14 calendar days prior to commencement of Waste Family Demonstration Testing.
 - i. If a shorter submittal time frame is desired, it must be requested by the Permittee and approved by the Director.
- c. Detailed conditions of Waste Family Demonstration Testing shall be included in the PDP for the Waste Family Demonstration Testing. In general, Waste Family Demonstration Testing shall consist of the following:
 - i. a determination of representative POHC's;
 - ii. the spiking of feed material with the chosen POHC(s), as necessary;
 - iii. the sampling of feed material as it is loaded into the TD unit;
 - iv. the analysis of the feed material sample for POHC concentration(s);
 - v. the processing of feed material through the TD unit;
 - vi. the sampling of process vent emission for POHCs;
 - vii. the analysis of the process vent emission sample for POHC concentration(s);
 - viii. the combination of feed material and process vent emission analytical results with the mass flow rates of the streams to calculate a RE for POHCs through the TD unit; and

- ix. the sampling and analysis of processed material and condensate to achieve a mass balance and fate analysis for the POHC(s).
- d. In addition to POHCs, known waste contaminants shall also be analyzed within the feed material, processed material, condensate, and process vent emissions. REs will be calculated for the primary known waste contaminants in the feed material. Primary known waste contaminants are defined in Attachment II-1-12, *Thermal Desorption Separation Plan*.
- e. Other required process vent emission tests shall be described in the PDP for the Waste Family Demonstration Testing.
- f. All sampling intervals shall be established and justified within the PDP for the Waste Family Demonstration Testing.
- g. Data from Waste Family Demonstration Testing shall be reported, with maximum, minimum, and average values presented, in the Post-Waste Family Demonstration Report.

6. SAMPLING AND ANALYTICAL METHODS

- a. A sampling plan shall be included in the PDP for the Demonstration Testing. This attachment shall include the following information for each sampling point:
 - i. a unique sample designation;
 - ii. the parameter(s) being measured;
 - iii. sampling and analytical methods used; and
 - iv. the frequency of sampling.
- b. The Permittee shall adhere to the preservation and holding times inherent to the analytical methods. Violation of these parameters shall invalidate the sample unless the Permittee can justify the validity of the sampling data.
- c. The feed material shall be sampled as it is being loaded into the feed hopper. The method for sampling feed material shall be included in the PDP for the Demonstration Testing.
- d. The processed material shall be sampled. The method for sampling processed material shall be included in the PDP for the Demonstration Testing.
- e. Process vent samples shall be collected from a sampling access port located after the primary and secondary carbon adsorption beds.

- f. The process vent shall be sampled with multiple simultaneous sampling trains using methods from 40 CFR 60 Appendix A.
 - i. Specific methods shall be described in the PDP for the Demonstration Testing.
 - ii. Emission Test Protocols shall also be provided in the PDP for the Demonstration Testing.
- g. The condensate shall be sampled. The method for sampling condensate shall be included in the PDP for the Demonstration Testing.
- h. Duplicate samples and field blanks shall be collected at an interval of at least 10% of the samples collected, to provide Quality Assurance (QA) during the sampling scheme. The QA testing shall be described in the PDP for the Demonstration Testing and documented in the Post-Demonstration Test Report.

7. NEW EQUIPMENT

- a. Prior to adding new equipment to the TD unit, the Permittee shall submit a Class 2 Permit Modification Request to the Director.
- b. As part of the Modification Request, the Permittee shall prepare a limited-scope PDP specific to Functional and Systems Testing of the new equipment.
- c. After Functional and Systems Testing has been completed, the Permittee may request Shakedown Operations as described in Section 4.
- d. Prior to the end of Shakedown Operations the Permittee shall determine whether further Demonstration Testing is necessary.
 - i. If it is determined that Demonstration Testing is necessary, the Permittee shall submit a limited-scope PDP specific to Demonstration Testing of the new equipment. Demonstration Testing shall not commence until after Director approval is obtained.
 - ii. If it is determined that Demonstration Testing is not necessary, the Permittee shall submit the justification for that determination to the Director for concurrence.
- e. If applicable, a Post-Demonstration Test Report shall be submitted to the Director.
- f. While the Post-Demonstration Test Report is being reviewed, the Permittee may request an interim operational period in accordance with Attachment II-1-12, *Thermal Desorption Separation Plan*.

END OF ATTACHMENT II-1-12-1