

ATTACHMENT 6-2
To Section 6, Procedures to Prevent Hazards

SUBPART BB
MONITORING PROGRAM
MANUAL

MIXED WASTE FACILITY
RCRA/TSCA PERMIT

Mixed Waste Facility

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1.0 INTRODUCTION

The intent of this manual is to help facility operators understand the requirements of a regulation that applies to certain permitted hazardous waste facilities. The manual includes example log sheets necessary to implement a program designed to comply with the regulation.

2.0 REQUIREMENTS OVERVIEW

Regulations in the 40 CFR Part 264, Subpart BB - Air Emission Standards for Equipment Leaks requires that hazardous waste facilities implement a program to monitor for fugitive air emissions. These requirements apply to specific types of equipment that manage a certain type of waste. Equipment subject to this monitoring program has to be properly identified, (i.e. tagged). The monitoring program consists of inspecting and testing the equipment to determine if fugitive emissions are present. The regulations require the implementation of a separate set of measures to repair the leak when inspection and test results detect fugitive emissions. Records of inspection, test, and repair must comply with specific requirements contained in the Subpart BB regulations.

3.0 APPLICABILITY

These regulations apply to permitted facilities that have equipment that contains or contacts hazardous waste-containing organic constituents in concentrations of at least 10% by weight.

4.0 DEFINITIONS

“Connector” means flanged, screwed, welded, or other joined fittings used to connect two pipelines or a pipeline and a piece of equipment. For the purposes of reporting and recordkeeping, connector means flanged fittings that are not covered by insulation or other materials that prevent location of the fittings.

“Control device” means an enclosed combustion device; vapor recovery system, or flare. Any device the primary function of which is the recovery or capture of solvents or other organics for use, reuse, or sale (e.g., a primary condenser on a solvent recovery unit) is not a control device.

“Equipment” means each valve, pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, or flange, and any control devices or systems required by this subpart.

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“First attempt at repair” means to take rapid action for the purpose of stopping or reducing leakage of organic material to the atmosphere using best practices.

“In gas/vapor service” means that the piece of equipment contains or contacts a hazardous waste stream that is in the gaseous state at operating conditions.

“In heavy liquid service” means that the piece of equipment is not in gas/vapor service or in light liquid service.

“In light liquid service” means that the piece of equipment contains or contacts a waste stream where the vapor pressure of one or more of the organic components in the stream is greater than 0.3 kilopascals (kPa) at 20°C, the total concentration of the pure organic components having a vapor pressure greater than 0.3 kilopascals (kPa) at 20°C is equal to or greater than 20 percent by weight, and the fluid is a liquid at operating conditions.

“In liquid service” means that the piece of equipment is not in gas/vapor service.

“Open-ended valve or line” means any valve, except for pressure relief valves, having one side of the valve seat in contact with process fluid and one side open to atmosphere, either directly or through open piping.

“Pressure release” means the emission of materials resulting from the system pressure being greater than the set pressure of the pressure relief device.

“Repaired” means that equipment is adjusted, or otherwise altered, to eliminate a leak.

5.0 EQUIPMENT TO BE MONITORED

The types of equipment subject to the Subpart BB regulations are:

1. Pumps in light liquid service
2. Valves in gas/vapor service or in light liquid service
3. Flanges and other connectors
4. Pressure relief devices in gas/vapor service
5. Compressors
6. Sampling connection systems

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in flanges and other connectors and to check for indications of liquid drippings from pump seals. This type of monitoring method is referenced in this manual as the inspection method.

9.0 MONITORING RESULTS

The regulations use different terms when they refer to results from monitoring conducted using one or another method. A positive test method result is indicated with the term "a leak is detected". The term "evidence of potential leak is found" is used to describe positive results for the inspection methods.

The regulations specify that an instrument reading of 10,000 ppm or greater above the background is enough to establish that fugitive emissions are present when the test method is used. The term used to describe the finding is "a leak is detected", as stated in the previous paragraph. Such a finding initiates the implementation of a set of measures designed to repair the leak.

As stated before, positive results from monitoring equipment or components using the inspection method is referenced in the regulations as "evidence of potential leak is found". The type of measures initiated by such results varies depending on the type of equipment or component being monitored. Measures to repair the leak must be implemented when liquid drippings from pump seals are discovered by visual inspection measures. The regulations require additional monitoring using the test method when evidence of potential leak is found in flanges.

10.0 MONITORING PROGRAM

The monitoring program is designed to comply with regulations in Subpart BB and is summarized below.

- I. Pumps in light liquid service.-
 - A. Monitor monthly by testing: a leak is detected when instrument reads $\geq 10,000$ ppm above the background.
 - B. Monitor weekly by visual inspection: a leak is detected when liquid drips from seal.
 - C. Conduct first attempt to repair: as soon as possible, not later than 5 days after detection date.
 - D. Complete repair (test result: $< 10,000$ ppm): within 15 days after detection date except as provided in 40 CFR 264.1059 titled "Standards: Delay of Repair."

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- II. Open-ended valves and lines.-
- A. Close with a cap, blind flange, plug, or a second valve which shall seal the open end at all times except when hazardous waste is flowing through the open-ended valve or line.
 - B. Each open-ended valve or line equipped with a second valve shall be operated in a manner such that the valve on the hazardous waste stream end is closed before the second valve is closed.
 - C. No monitoring for equipment leaks is required for open-ended valves or lines
- III. Valves in light liquid service or gas/vapor service.-
- A. Monitor monthly by testing: a leak is detected when instrument reads $\geq 10,000$ ppm above the background.
 - B. When a leak is not detected for 2 consecutive months, monitoring may continue the first month of every succeeding quarter, beginning with the next quarter, until a leak is detected. Once a leak is detected, the valve shall be monitored monthly until a leak is not detected for two (2) consecutive months.
 - C. Conduct first attempt to repair: as soon as possible, but not later than 5 days after detection date (repair attempts should include, but are not limited to, tightening or replacing bonnet bolts, tightening of packing gland nuts, and injection of lubricant into lubricated packing).
 - D. Complete repair (test result: $< 10,000$ ppm): within 15 days after detection date except as provided in 40 CFR 264.1059
 - E. Above-mentioned monitoring is not required for valves designated as "no detectable emissions" provided requirements of 40 CFR 264.1057(f) are followed; for valves designated as "unsafe to monitor" if requirements of 40 CFR 264.1057(g) are followed; and for valves designated as "difficult to monitor" if the requirements of 40 CFR 264.1057(h) are followed.
 - G. Facility may opt to use alternate standards for valves as specified in 40 CFR 264.1061 or 40 CFR 1062.
- IV. Pumps and valves in heavy liquid service and flanges and other connectors.-
- A. Monitor weekly by inspection: check for evidence of potential leaks.
 - B. Monitor by testing within 5 days after evidence of potential leak is found: a leak is detected when instrument reads $\geq 10,000$ ppm above the background.
 - C. Conduct first attempt to repair: not later than 5 days after detection date.
 - D. Complete repair (test result: $< 10,000$ ppm): within 15 days after detection date.

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- E. Monitoring (and recordkeeping) is not required for any connector that is inaccessible or is ceramic or ceramic-lined.

- V. Pressure relief devices in vapor service.-
 - A. A pressure relief device in vapor service shall be operated with no detectable emissions, as measured by the method specified in Subpart BB §264.1063(c) (when tested in compliance with Reference Method 21 and results show an instrument reading of less than 500 ppm above background) except during pressure release.
 - B. After each pressure relief: as soon as practicable, but not later than 5 days after the pressure relief, return device to a condition of no detectable emissions except as provided in 40 CFR 264.1059.
 - C. Monitor by testing within 5 days after each pressure relief: to ensure that the device meets the condition of no detectable emission.
 - D. No monitoring is required for pressure relief device equipped with a closed-vent system capable of capturing and transferring leakage to a control device.

11.0 RECORDKEEPING

The facility is required to keep a list of the equipment subject to the Subpart BB regulations and records of monitoring results and repair events for leaking equipment. A recordkeeping system designed to comply with the requirements has been implemented. The system consists of separate logs that include all the provisions listed in the regulations. Information contained in this manual is also used to comply with the recordkeeping requirements.

Three logs will be used to comply with the requirements; the Equipment Compliance Summary and Monitoring Log Sheet (ECSML); the Leak Repair Log Sheet (LRL); and the Gas Indicator Instrument Log Sheet, which shall be kept in the facility operating record. Example copies of the logs LRL are included. Subpart BB regulations require that records be kept for each piece of equipment subject to the monitoring and repair requirements as described below.

The following equipment information will be recorded and kept in the facility operating record:

- I. The equipment identification number (ID #) and hazardous waste management unit identification.
- II. Approximate locations within the facility.

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- III. Type of equipment.
- IV. Percent-by-weight of total organics in the hazardous waste stream at the equipment.
- V. Hazardous waste state and service at the equipment.
- VI. Method of compliance with the standard.

The ECSML log will be used to record the results of the inspection and test methods. If a leak is detected, a LRL form will be filled out. The following information must be recorded in an inspection log (LRL) and kept in the facility operating record for each leak detected as specified in the monitoring program:

- I. The equipment identification number: for which the leak was detected.
- II. The date evidence of a potential leak was found in accordance with §264.1058(a).
- III. The date the leak was detected and the dates of each attempt to repair the leak.
- IV. Repair methods applied in each attempt to repair the leak.
- V. "Above 10,000" if the maximum instrument reading measured by the methods specified in §264.1063(b) after each repair attempt is equal to or greater than 10,000 ppm.
- VI. "Repair delayed" and the reason for the delay if a leak is not repaired within 15 calendar days after discovery of the leak.
- VII. Documentation supporting the delay of repair of a valve in compliance with §264.1059(c): Documentation supporting the delay of repair of a valve will be attached to the LRL for the monitoring point in question, if the cause of the delay is in accordance with §264.1059(c).
- VII. The signature of the owner or operator (or designate) whose decision it was that repair could not be effected without hazardous waste management unit shutdown.
- IX. The expected date of successful repair of the leak if a leak is not repaired within 15 calendar days.
- X. Dates of process unit shutdowns that may have occurred while the equipment is unrepaired.
- XI. The date of successful repair of the leak.

In addition, gas indication instrument log sheet will be completed each day the instrument is used to detect any leaks. The instrument operation identification will be listed on this log sheet. These records (ECSML and LRL) must be kept for a minimum of 3 years.

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instructions contained in the instrument manual. Information concerning instrument calibration events and results are recorded in the Gas Indicator Instrument Log sheet included in Exhibit 3.

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EXHIBIT 1

EXAMPLE EQUIPMENT COMPLIANCE SUMMARY AND MONITORING LOG AND DRAWINGS

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Example Equipment Compliance Summary and Monitoring Log Sheet (ECSML) for Thermal Desorber for Dangerous Material Having Total Organics Equal to or Greater than 10%

BB EQUIPMENT COMPLIANCE SUMMARY AND MONITORING LOG SHEET

This sheet is for Thermal Desorber equipment contacting Hazardous Waste Liquid in Subpart BB Light Liquid Service.

Inspector Name: _____ Inspector Signature: _____ Instrument ID #: _____ Date: _____
 Equipment listed in this table is subject to the monthly leak detection and repair compliance method. Monitoring by testing means in accordance with S 264.1063(b) and by inspection means by visual, olfactory, audible, or other method.
 Background level measured: _____

Monitoring Point ID#	Material	Equipment Type	Inspection Frequency	Testing * Frequency	Potential Leak Evidence Found		Test by Date	Maximum Concentration	Leak Detected		Repair by Date
					No	Yes			No	Yes	
HV-206	Condensate	Valve	NA	Monthly	NA	NA	NA				
HV-207	Condensate	Valve	NA	Monthly	NA	NA	NA				
HV-208	Condensate	Valve	NA	Monthly	NA	NA	NA				
HV-209	Condensate	Valve	NA	Monthly	NA	NA	NA				
HV-210	Condensate	Valve	NA	Monthly	NA	NA	NA				
HV-211	Condensate	Valve	NA	Monthly	NA	NA	NA				
HV-212	Condensate	Valve	NA	Monthly	NA	NA	NA				
HV-214	Condensate	Valve	NA	Monthly	NA	NA	NA				
HV-215	Condensate	Valve	NA	Monthly	NA	NA	NA				
HV-231	Condensate	Valve	NA	Monthly	NA	NA	NA				
HV-284	Condensate	Valve	NA	Monthly	NA	NA	NA				
HV-286	Condensate	Valve	NA	Monthly	NA	NA	NA				
HV-320	Condensate	Valve	NA	Monthly	NA	NA	NA				
HV-321	Condensate	Valve	NA	Monthly	NA	NA	NA				

RCRA/TSCA Permit Application

Section 6 - Procedures to Prevent Hazards

Attachment 6-2 - Subpart BB Monitoring Program Manual

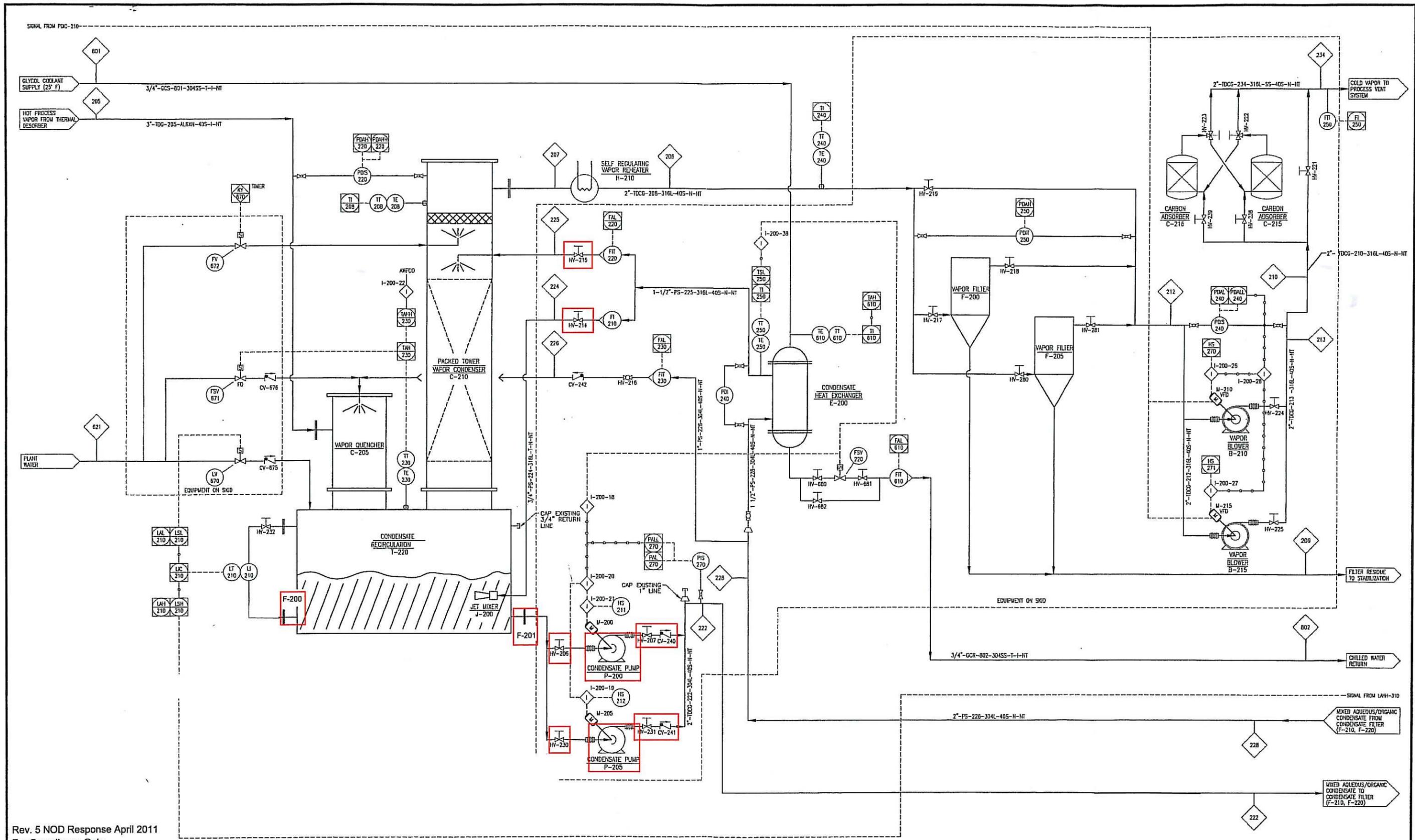
Att. 6-2-11

Revision 1
May 2011
Exhibit 1

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HV-324	Condensate	Valve	NA	Monthly	NA	NA	NA	NA
HV-325	Condensate	Valve	NA	Monthly	NA	NA	NA	NA
HV-326	Condensate	Valve	NA	Monthly	NA	NA	NA	NA
LV-225	Condensate	Valve	NA	Monthly	NA	NA	NA	NA
CV-240	Condensate	Valve	NA	Monthly	NA	NA	NA	NA
CV-241	Condensate	Valve	NA	Monthly	NA	NA	NA	NA
P-200	Condensate	Pump	Weekly	Monthly				
P-205	Condensate	Pump	Weekly	Monthly				
P-310	Condensate	Pump	Weekly	Monthly				
F-200	Condensate	Flange	Weekly	NA				
F-201	Condensate	Flange	Weekly	NA				
F-220	Condensate	Flange	Weekly	NA				
F-221	Condensate	Flange	Weekly	NA				
F-222	Condensate	Flange	Weekly	NA				
F-223	Condensate	Flange	Weekly	NA				
F-300	Condensate	Flange	Weekly	NA				
F-301	Condensate	Flange	Weekly	NA				
F-304	Condensate	Flange	Weekly	NA				
F-305	Condensate	Flange	Weekly	NA				
F-308	Condensate	Flange	Weekly	NA				
F-310	Condensate	Flange	Weekly	NA				

* for Valves the Testing Frequency can be changed to Quarterly pursuant to 264.1057 (c) or Annually pursuant to 264.1061 (b) or 264.1062 (b).



Rev. 5 NOD Response April 2011
 For Compliance Only
 Equipment subject to Subpart BB
 indicated by red box

NO.	BY	DATE	CHK	REVISIONS	DRAWING NO.	REFERENCE DRAWINGS
4	ZLF	10/24/03		AS-BUILT		
3	ZLF	2/18/03	SJS	MODER AND MINOR CHANGES		
2	RSJ	12/30/04	SJS	MODER AND MINOR CHANGES		
1	SJS	12/10/04	SJS	REVISED STREAM FLAGS		
0	RKL	11/23/04	RKL	INITIAL DRAWING RELEASE		

DEPT/REVISION	0	1	2	3	4	5	6	7	8	9
PROCESS										
PIPING										
ELECTRICAL										
STRUCTURAL										
PROJECT ENL.										
QA										
CLIENT										
SHOP										

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TOLERANCE UNLESS SPECIFIED:

FRACTIONS	DECIMALS	ANGLES
± 1/16	± 0.01	± 1/2°
	± 0.005	

EQUINOX, Ltd.
 Santa Fe, New Mexico 87505

MERLIN Engineering, Inc.
 Boulder, Colorado 80302

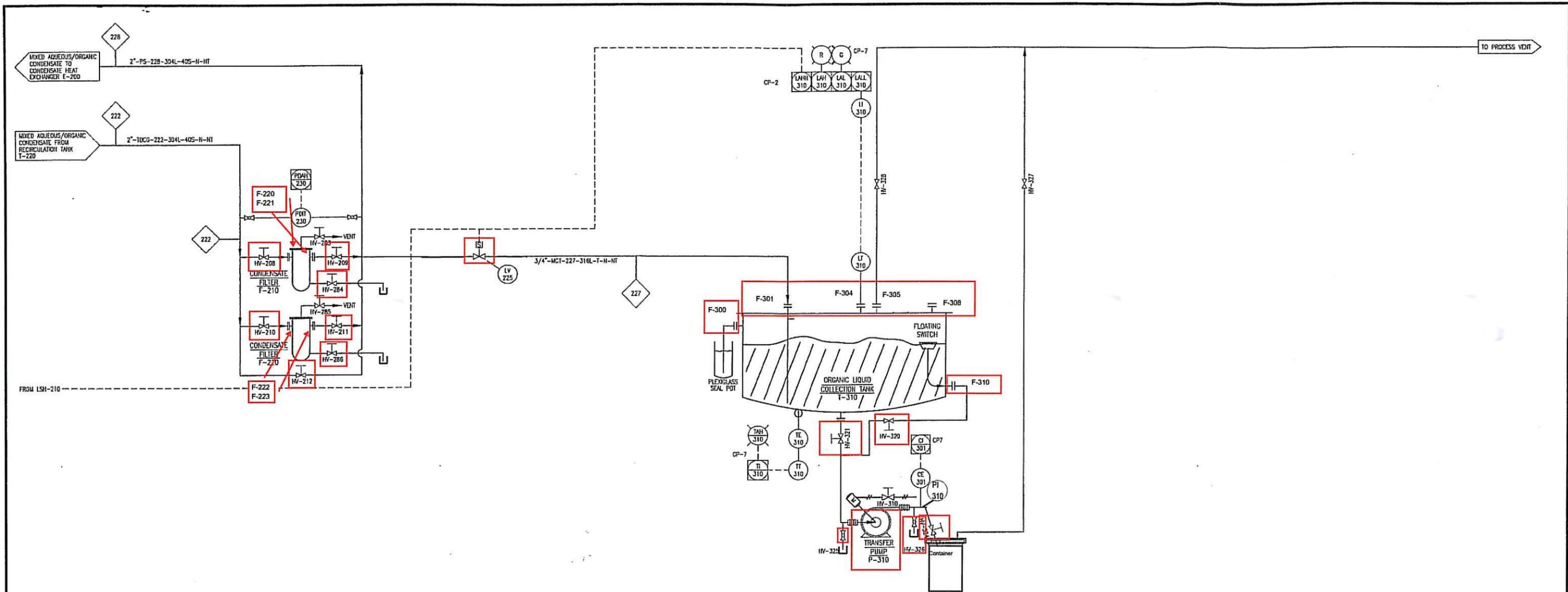
CLIENT PROJECT NO. _____
 DRAWN BY: R. A. LOESCH DATE: 8/5/2004
 ENGINEERING: J. S. VAVRUSKA DATE: 8/1/2004
 CHECKED BY: R. A. KOENIG DATE: 8/10/2004

MERLIN PROJECT NO. TCC-PEC

NUVOTEC USA
 Richland, Washington 99350 509-943-5310

PECOS MLW PROJECT
THERMAL DESORBER CONDENSER/VAPOR SYSTEM
-PIPING AND INSTRUMENT DIAGRAM, AREA 200-

SCALE: NONE
 MERLIN DRAWING NO. 32004-PID-201
 SHEET 1 OF 4
 REV. 4



Rev. 5 NOD Response April 2011
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NO.	BY	DATE	CHK	REVISIONS	DRAWING NO.	REFERENCE DRAWINGS
4	ZJF	10/24/05		AS-BUILT		
3	ZJF	2/18/05	SJS	MEIER AND MOUNTED CHANGES		
2	RSL	12/30/04	SJS	MEIER AND MOUNTED CHANGES		
1	SJS	12/10/04	SJS	REVISED STREAM FLAGS		
0	RAL	11/24/04	RAK	INITIAL DRAWING RELEASE		

DEPT/REVISION	0																			
PROCESS																				
PIPING																				
ELECTRICAL																				
STRUCTURAL																				
PROJECT ENG.																				
QA																				
CLIENT																				
SHOP																				

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TOLERANCE UNLESS SPECIFIED:

FRACTIONS	DECIMALS	ANGLES
± 1/16	X/XX ±0.01	± 1/2°
	K/XXX ±0.005	

EQUINOX, Ltd. Santa Fe, New Mexico 87505		
MERLIN Engineering, Inc. Boulder, Colorado 80302		
CLIENT PROJECT NO.	DRAWN BY: R. A. LOESCH	DATE: 9/26/2004
MERLIN PROJECT NO.	ENGINEERING: J. S. VAVRUSKA	DATE: 9/15/2004
TCC-PEC	CHECKED BY: R. A. KOENIG	DATE: 9/26/2004

NUVOTEC USA Richland, Washington 99350 509-943-5319		
PEcos MLW PROJECT LIQUID WASTE PRE-TREATMENT -PIPING AND INSTRUMENT DIAGRAM, AREA 300-		
SCALE: NONE	MERLIN DRAWING NO. 32004-PID-300	SHEET OF 4

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EXHIBIT 2

EXAMPLE LEAK REPAIR LOG

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EXHIBIT 3

EXAMPLE GAS INDICATOR INSTRUMENT LOG

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EXAMPLE GAS INDICATOR INSTRUMENT LOG SHEET

Note: Calibration gasses shall be zero air (less than 10 ppm of hydrocarbon in air) and a mixture of methane or n-hexane and air at a concentration of approximately, but less than 10,000 ppm methane or n-hexane. The instrument must be calibrated before use on each day of its use by the procedures specified in Reference Method 21. Enter the name of gas after the concentration of gas mixture in columns below.

Date	Instrument ID No.	Operator Name	Concentration of Gas Mixture Used to Calibrate Range	Concentration of Gas Mixture Used to Calibrate Low Range	Observations and Comments

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EXHIBIT 4

REFERENCE METHOD 21, 40 CFR PART 60, APPENDIX A

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40 CFR 60 Appendix A Method 21-Determination of Volatile Organic Compound Leaks

1.0 Scope and Application

1.1 Analytes.

Analyte	CAS No.
Volatile Organic Compounds (VOC)	No CAS number assigned.

1.2 Scope. This method is applicable for the determination of VOC leaks from process equipment. These sources include, but are not limited to, valves, flanges and other connections, pumps and compressors, pressure relief devices, process drains, open-ended valves, pump and compressor seal system degassing vents, accumulator vessel vents, agitator seals, and access door seals.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

2.0 Summary of Method

2.1 A portable instrument is used to detect VOC leaks from individual sources. The instrument detector type is not specified, but it must meet the specifications and performance criteria contained in Section 6.0. A leak definition concentration based on a reference compound is specified in each applicable regulation. This method is intended to locate and classify leaks only, and is not to be used as a direct measure of mass emission rate from individual sources.

3.0 Definitions

3.1 *Calibration gas* means the VOC compound used to adjust the instrument meter reading to a known value. The calibration gas is usually the reference compound at a known concentration approximately equal to the leak definition concentration.

3.2 *Calibration precision* means the degree of agreement between measurements of the same known value, expressed as the relative percentage of the average difference between the meter readings and the known concentration to the known concentration.

3.3 *Leak definition concentration* means the local VOC concentration at the surface of a leak source that indicates that a VOC emission (leak) is present. The leak definition is an instrument meter reading based on a reference compound.

3.4 *No detectable emission* means a local VOC concentration at the surface of a leak source, adjusted for local VOC ambient concentration, that is less than 2.5 percent of the specified leak definition concentration. that indicates that a VOC emission (leak) is not present.

3.5 *Reference compound* means the VOC species selected as the instrument calibration basis for specification of the leak definition concentration. (For example, if a leak definition concentration is 10,000 ppm as methane, then any source emission that results in a local concentration that yields a meter reading of 10,000 on an instrument meter calibrated with methane would be classified as a leak. In this example, the leak definition concentration is 10,000 ppm and the reference compound is methane.)

3.6 *Response factor* means the ratio of the known concentration of a VOC compound to the observed meter reading when measured using an instrument calibrated with the reference compound specified in the applicable regulation.

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3.7 *Response time* means the time interval from a step change in VOC concentration at the input of the sampling system to the time at which 90 percent of the corresponding final value is reached as displayed on the instrument readout meter.

4.0 Interferences[Reserved]

5.0 Safety

5.1 **Disclaimer.** This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 **Hazardous Pollutants.** Several of the compounds, leaks of which may be determined by this method, may be irritating or corrosive to tissues (*e.g.*, heptane) or may be toxic (*e.g.*, benzene, methyl alcohol). Nearly all are fire hazards. Compounds in emissions should be determined through familiarity with the source. Appropriate precautions can be found in reference documents, such as reference No. 4 in Section 16.0.

6.0 Equipment and Supplies

A VOC monitoring instrument meeting the following specifications is required:

6.1 The VOC instrument detector shall respond to the compounds being processed. Detector types that may meet this requirement include, but are not limited to, catalytic oxidation, flame ionization, infrared absorption, and photoionization.

6.2 The instrument shall be capable of measuring the leak definition concentration specified in the regulation.

6.3 The scale of the instrument meter shall be readable to ± 2.5 percent of the specified leak definition concentration.

6.4 The instrument shall be equipped with an electrically driven pump to ensure that a sample is provided to the detector at a constant flow rate. The nominal sample flow rate, as measured at the sample probe tip, shall be 0.10 to 3.0 l/min (0.004 to 0.1 ft³ /min) when the probe is fitted with a glass wool plug or filter that may be used to prevent plugging of the instrument.

6.5 The instrument shall be equipped with a probe or probe extension or sampling not to exceed 6.4 mm (1/4in) in outside diameter, with a single end opening for admission of sample.

6.6 The instrument shall be intrinsically safe for operation in explosive atmospheres as defined by the National Electrical Code by the National Fire Prevention Association or other applicable regulatory code for operation in any explosive atmospheres that may be encountered in its use. The instrument shall, at a minimum, be intrinsically safe for Class 1, Division 1 conditions, and/or Class 2, Division 1 conditions, as appropriate, as defined by the example code. The instrument shall not be operated with any safety device, such as an exhaust flame arrestor, removed.

7.0 Reagents and Standards

7.1 Two gas mixtures are required for instrument calibration and performance evaluation:

7.1.1 Zero Gas. Air, less than 10 parts per million by volume (ppmv) VOC.

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7.1.2 Calibration Gas. For each organic species that is to be measured during individual source surveys, obtain or prepare a known standard in air at a concentration approximately equal to the applicable leak definition specified in the regulation.

7.2 Cylinder Gases. If cylinder calibration gas mixtures are used, they must be analyzed and certified by the manufacturer to be within 2 percent accuracy, and a shelf life must be specified. Cylinder standards must be either reanalyzed or replaced at the end of the specified shelf life.

7.3 Prepared Gases. Calibration gases may be prepared by the user according to any accepted gaseous preparation procedure that will yield a mixture accurate to within 2 percent. Prepared standards must be replaced each day of use unless it is demonstrated that degradation does not occur during storage.

7.4 Mixtures with non-Reference Compound Gases. Calibrations may be performed using a compound other than the reference compound. In this case, a conversion factor must be determined for the alternative compound such that the resulting meter readings during source surveys can be converted to reference compound results.

8.0 Sample Collection, Preservation, Storage, and Transport

8.1 Instrument Performance Evaluation. Assemble and start up the instrument according to the manufacturer's instructions for recommended warmup period and preliminary adjustments.

8.1.1 Response Factor. A response factor must be determined for each compound that is to be measured, either by testing or from reference sources. The response factor tests are required before placing the analyzer into service, but do not have to be repeated at subsequent intervals.

8.1.1.1 Calibrate the instrument with the reference compound as specified in the applicable regulation. Introduce the calibration gas mixture to the analyzer and record the observed meter reading. Introduce zero gas until a stable reading is obtained. Make a total of three measurements by alternating between the calibration gas and zero gas. Calculate the response factor for each repetition and the average response factor.

8.1.1.2 The instrument response factors for each of the individual VOC to be measured shall be less than 10 unless otherwise specified in the applicable regulation. When no instrument is available that meets this specification when calibrated with the reference VOC specified in the applicable regulation, the available instrument may be calibrated with one of the VOC to be measured, or any other VOC, so long as the instrument then has a response factor of less than 10 for each of the individual VOC to be measured.

8.1.1.3 Alternatively, if response factors have been published for the compounds of interest for the instrument or detector type, the response factor determination is not required, and existing results may be referenced. Examples of published response factors for flame ionization and catalytic oxidation detectors are included in References 1-3 of Section 17.0.

8.1.2 Calibration Precision. The calibration precision test must be completed prior to placing the analyzer into service and at subsequent 3-month intervals or at the next use, whichever is later.

8.1.2.1 Make a total of three measurements by alternately using zero gas and the specified calibration gas. Record the meter readings. Calculate the average algebraic difference between the meter readings and the known value. Divide this average difference by the known calibration value and multiply by 100 to express the resulting calibration precision as a percentage.

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8.1.2.2 The calibration precision shall be equal to or less than 10 percent of the calibration gas value.

8.1.3 Response Time. The response time test is required before placing the instrument into service. If a modification to the sample pumping system or flow configuration is made that would change the response time, a new test is required before further use.

8.1.3.1 Introduce zero gas into the instrument sample probe. When the meter reading has stabilized, switch quickly to the specified calibration gas. After switching, measure the time required to attain 90 percent of the final stable reading. Perform this test sequence three times and record the results. Calculate the average response time.

8.1.3.2 The instrument response time shall be equal to or less than 30 seconds. The instrument pump, dilution probe (if any), sample probe, and probe filter that will be used during testing shall all be in place during the response time determination.

8.2 Instrument Calibration. Calibrate the VOC monitoring instrument according to Section 10.0.

8.3 Individual Source Surveys.

8.3.1 Type I-Leak Definition Based on Concentration. Place the probe inlet at the surface of the component interface where leakage could occur. Move the probe along the interface periphery while observing the instrument readout. If an increased meter reading is observed, slowly sample the interface where leakage is indicated until the maximum meter reading is obtained. Leave the probe inlet at this maximum reading location for approximately two times the instrument response time. If the maximum observed meter reading is greater than the leak definition in the applicable regulation, record and report the results as specified in the regulation reporting requirements. Examples of the application of this general technique to specific equipment types are:

8.3.1.1 Valves. The most common source of leaks from valves is the seal between the stem and housing. Place the probe at the interface where the stem exits the packing gland and sample the stem circumference. Also, place the probe at the interface of the packing gland take-up flange seat and sample the periphery. In addition, survey valve housings of multipart assembly at the surface of all interfaces where a leak could occur.

8.3.1.2 Flanges and Other Connections. For welded flanges, place the probe at the outer edge of the flange-gasket interface and sample the circumference of the flange. Sample other types of nonpermanent joints (such as threaded connections) with a similar traverse.

8.3.1.3 Pumps and Compressors. Conduct a circumferential traverse at the outer surface of the pump or compressor shaft and seal interface. If the source is a rotating shaft, position the probe inlet within 1 cm of the shaft-seal interface for the survey. If the housing configuration prevents a complete traverse of the shaft periphery, sample all accessible portions. Sample all other joints on the pump or compressor housing where leakage could occur.

8.3.1.4 Pressure Relief Devices. The configuration of most pressure relief devices prevents sampling at the sealing seat interface. For those devices equipped with an enclosed extension, or horn, place the probe inlet at approximately the center of the exhaust area to the atmosphere.

8.3.1.5 Process Drains. For open drains, place the probe inlet at approximately the center of the area open to the atmosphere. For covered drains, place the probe at the surface of the cover interface and conduct a peripheral traverse.

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8.3.1.6 Open-ended Lines or Valves. Place the probe inlet at approximately the center of the opening to the atmosphere.

8.3.1.7 Seal System Degassing Vents and Accumulator Vents. Place the probe inlet at approximately the center of the opening to the atmosphere.

8.3.1.8 Access door seals. Place the probe inlet at the surface of the door seal interface and conduct a peripheral traverse.

8.3.2 Type II-"No Detectable Emission". Determine the local ambient VOC concentration around the source by moving the probe randomly upwind and downwind at a distance of one to two meters from the source. If an interference exists with this determination due to a nearby emission or leak, the local ambient concentration may be determined at distances closer to the source, but in no case shall the distance be less than 25 centimeters. Then move the probe inlet to the surface of the source and determine the concentration as outlined in Section 8.3.1. The difference between these concentrations determines whether there are no detectable emissions. Record and report the results as specified by the regulation. For those cases where the regulation requires a specific device installation, or that specified vents be ducted or piped to a control device, the existence of these conditions shall be visually confirmed. When the regulation also requires that no detectable emissions exist, visual observations and sampling surveys are required. Examples of this technique are:

8.3.2.1 Pump or Compressor Seals. If applicable, determine the type of shaft seal. Perform a survey of the local area ambient VOC concentration and determine if detectable emissions exist as described in Section 8.3.2.

8.3.2.2 Seal System Degassing Vents, Accumulator Vessel Vents, Pressure Relief Devices. If applicable, observe whether or not the applicable ducting or piping exists. Also, determine if any sources exist in the ducting or piping where emissions could occur upstream of the control device. If the required ducting or piping exists and there are no sources where the emissions could be vented to the atmosphere upstream of the control device, then it is presumed that no detectable emissions are present. If there are sources in the ducting or piping where emissions could be vented or sources where leaks could occur, the sampling surveys described in Section 8.3.2 shall be used to determine if detectable emissions exist.

8.3.3 Alternative Screening Procedure.

8.3.3.1 A screening procedure based on the formation of bubbles in a soap solution that is sprayed on a potential leak source may be used for those sources that do not have continuously moving parts, that do not have surface temperatures greater than the boiling point or less than the freezing point of the soap solution, that do not have open areas to the atmosphere that the soap solution cannot bridge, or that do not exhibit evidence of liquid leakage. Sources that have these conditions present must be surveyed using the instrument technique of Section 8.3.1 or 8.3.2.

8.3.3.2 Spray a soap solution over all potential leak sources. The soap solution may be a commercially available leak detection solution or may be prepared using concentrated detergent and water. A pressure sprayer or squeeze bottle may be used to dispense the solution. Observe the potential leak sites to determine if any bubbles are formed. If no bubbles are observed, the source is presumed to have no detectable emissions or leaks as applicable. If any bubbles are observed, the instrument techniques of Section 8.3.1 or 8.3.2 shall be used to determine if a leak exists, or if the source has detectable emissions, as applicable.

9.0 Quality Control

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Section	Quality control measure	Effect
8.1.2	Instrument calibration precision check	Ensure precision and accuracy, respectively, of instrument response to standard.
10.0	Instrument calibration	

10.0 Calibration and Standardization

10.1 Calibrate the VOC monitoring instrument as follows. After the appropriate warmup period and zero internal calibration procedure, introduce the calibration gas into the instrument sample probe. Adjust the instrument meter readout to correspond to the calibration gas value.

Note: If the meter readout cannot be adjusted to the proper value, a malfunction of the analyzer is indicated and corrective actions are necessary before use.

11.0 Analytical Procedures[Reserved]

12.0 Data Analyses and Calculations[Reserved]

13.0 Method Performance[Reserved]

14.0 Pollution Prevention[Reserved]

15.0 Waste Management[Reserved]

16.0 References

1. Dubose, D.A., and G.E. Harris. Response Factors of VOC Analyzers at a Meter Reading of 10,000 ppmv for Selected Organic Compounds. U.S. Environmental Protection Agency, Research Triangle Park, NC. Publication No. EPA 600/2-81051. September 1981.

2. Brown, G.E., *et al.* Response Factors of VOC Analyzers Calibrated with Methane for Selected Organic Compounds. U.S. Environmental Protection Agency, Research Triangle Park, NC. Publication No. EPA 600/2-81-022. May 1981.

3. DuBose, D.A. *et al.* Response of Portable VOC Analyzers to Chemical Mixtures. U.S. Environmental Protection Agency, Research Triangle Park, NC. Publication No. EPA 600/2-81-110. September 1981.

4. Handbook of Hazardous Materials: Fire, Safety, Health. Alliance of American Insurers. Schaumburg, IL. 1983.

17.0 Tables, Diagrams, Flowcharts, and Validation Data[Reserved]