Hazardous Waste Combustion Unit Permitting Manual

COMPONENT 4

How To Conduct Trial Burn Test Oversight

U.S. EPA Region 6 Center for Combustion Science and Engineering

Tetra Tech EM Inc.

COMPONENT FOUR

HOW TO CONDUCT TRIAL BURN TEST OVERSIGHT

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ABBREVIATIONS AND ACRONYMS

APCS	Air pollution control system
BIF	Boiler and industrial furnace
CEMS	Continuous emissions monitoring system
40 CFR	Title 40, Code of Federal Regulations
°C	Degrees Celsius
CO	Carbon monoxide
DACS	Data acquisition control system
DAR	Data acquisition recorder
DRE	Destruction and removal efficiency
DTI	Digital temperature indicator
°F	Degrees Fahrenheit
gpm	gallons per minute
GC/FID	Gas chromatograph/flame ionization detector
HAF	Halogen acid furnace
Hg	Mercury
HSP	Health and safety plan
lb/hr	pounds per hour
LEL	Lower explosive limit
mg/m^3	milligrams per cubic meter
mL	milliliters
O_2	Oxygen
OSHA	Occupational Safety & Health Administration
OSWER	Office of Solid Waste and Emergency Response
PCDD/PCDF	Polychlorinated dibenzopdioxin/polychlorinated dibenzofuran
PPE	Personal protection equipment
ppm	parts per million
POHC	Principal organic hazardous constituent
QA	Quality assurance
QAPP	Quality assurance project plan
QA/QC	Quality assurance/quality control
RBP	Risk burn plan
RCRA	Resource Conservation and Recovery Act
RTP	Research Triangle Park
SOP	Standard operating procedure
SVOC	Semivolatile organic compound
TBO	Trial burn oversight
TBP	Trial burn plan
UB	Utility boiler
U.S. EPA	U.S. Environmental Protection Agency
VOA	Volatile organic analysis
VOST	Volatile organic sampling train

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1.0 OVERVIEW OF TRIAL BURN TEST OVERSIGHT

Regulations: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: To ensure that the trial burn or risk burn is conducted in accordance with the approved trial burn plan (TBP) or risk burn plan (RBP), the quality assurance project plan (QAPP), and the standard operating procedures (SOP) identified in various regulatory and guidance documents, comprehensive trial burn oversight (TBO) is conducted. Findings of the trial burn oversight determine whether trial burn results are acceptable.

Stack gas sampling and recovery checklists that can be used as tools in conducting trial burn test oversight are included as Attachments A through X to this component of the Hazardous Waste Combustion Unit Permitting Manual. Attachment Y is a checklist that an observer may use in the field to ensure that all necessary activities are completed. This checklist summarizes all important aspects of every section in this component.

Check For: Before mobilizing to the facility for oversight, the observer should be familiar with:

- ❑ Preparation activities
- ❑ Conducting field activities
- ❑ Writing the TBO report
- ❑ Stack gas sampling and recovery checklists (Attachments A through X)
- ❑ TBO checklist (Attachment Y)

Example Situation: XYZ Company submitted to U.S. EPA (1) destruction and removal efficiency (DRE) burn plans for the utility boiler (UB) and the halogen acid furnace (HAF), (2) RBPs for the UB and the HAF, and (3) a multimedia risk assessment work plan for the UB and the HAF. U.S. EPA has approved the TBPs for both boilers and requested that the XYZ Company provide additional information to document types of wastes to be combusted in the UB and the HAF during the risk burn, representing worst-case waste. In response to U.S. EPA's request for information, XYZ Company certified that the facility will combust worst-case waste streams and will also spike additional amounts of higher-risk compounds to ensure that a worst-case waste situation exists during the risk burn. After reviewing the information, U.S. EPA approved the RBPs for the UB and the HAF.

Lois and Clark of Metropolis were selected to conduct oversight of trial burn testing at XYZ Company. Before mobilizing to the facility, Lois and Clark reviewed the DRE burn plan and RBPs and were informed of (1) the type and design of BIF units to be tested, (2) types of tests to be performed, (3) samples to

be collected, (4) sampling procedures to be followed, and (5) process operating conditions that would be maintained during the tests. Lois and Clark prepared an HSP that addressed all applicable regulatory requirements, personnel responsibilities, personal protective equipment (PPE), and health and safety and emergency response procedures.

Lois and Clark conducted oversight of the trial burn that included (1) auditing equipment calibration records, (2) observing the sampling activities and process operating conditions, (3) evaluating conformance with procedures described in approved burn plans, (4) recording observations, and (5) collecting process operating data and field logsheets. Lois and Clark returned to Metropolis and wrote a report to document stack sampling activities, process operating conditions, and observation and oversight activities.

Example Action: U.S. EPA will use the oversight report provided by Lois and Clark to (1) determine the acceptability of the DRE and risk burn tests, (2) evaluate the trial burn and risk burn reports, and (3) prepare permit conditions based on the DRE and risk burn test conditions.

Notes: _____

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2.0 PREPARATION ACTIVITIES

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: Trial burn oversight consists of several prefield activities, including (1) developing a health and safety plan (HSP), (2) reviewing the TBP, (3) contacting facility trial burn personnel, (4) obtaining audit gas samples, and (5) mobilizing to the field. To ensure that the trial burn is conducted in strict accordance with the approved TBP and that the data collected are of adequate quality to establish permit conditions that protect human health and the environment, members of the oversight team should familiarize themselves with the TBP, RBP, and QAPP. To ensure oversight safety, a site-specific HSP that details site hazards and provides routine and emergency safety procedures should be developed prior to mobilizing to the field.

Check For: Complete the following tasks before arriving at the facility to conduct trial burn oversight:

- ❑ Review TBP
- ❑ Review RBP
- ❑ Review QAPP
- ❑ Prepare a site-specific HSP
- ❑ Collect appropriate stack gas sampling and recovery checklists to be completed on site (see attachments)
- ❑ Gather appropriate health and safety equipment

Sections 2.1 and 2.2 describe the above items in detail.

Example Situation: Lois and Clark review the TBP, RBP, and QAPP thoroughly in accordance with procedures suggested in Component 1—How to Review a Trial Burn Plan and Component 2—How to Review a Quality Assurance Project Plan. After the review of the TBP, RBP, and QAPP have been reviewed, Lois and Clark collect appropriate stack gas sampling and recovery checklists to be completed during the trial burn. Clark identifies test site hazards and prepares a list of hazardous chemicals present at the test site along with their concentrations. Lois and Clark make sure that oversight equipment includes field notebook, hard hat, steel-toed boots, and flame resistant coveralls. Lois prepares a site-specific HSP that addresses routine and emergency safety procedures and the PPE required for the trial burn. Lois and Clark then make travel arrangements to arrive at the facility.

Example Comments: Trial burns often pose both unique and challenging field problems. To resolve these issues promptly and effectively, the oversight team may need to refer to

numerous guidance documents, contact appropriate regulatory personnel, or both. The oversight team should carry to the field various guidance documents and names and telephone numbers of the regulatory personnel who are experienced in trial burn observations and related issues.

Notes:

2.1 REVIEWING THE TRIAL BURN PLAN AND QUALITY ASSURANCE PROJECT PLAN

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: To ensure thorough oversight of a trial burn, it is important to review and understand the TBP, RBP, and QAPP before mobilizing the oversight team to the field. Specifically, the oversight personnel should complete the portions of the oversight checklist that can be filled out before the trial burn begins.

Check for: Confirm that all members of the oversight team understand the following:

- ❑ General facility information
- ❑ Proposed stack gas sampling procedures
- ❑ Proposed waste feed and process residuals sampling procedures

Example Situation: Clark reads the *Project Organization* section of the TBP as follows:

"ABC Environmental, under contract to XYZ Company, will be conducting the trial burn and will provide personnel experienced with Resource Conservation and Recovery Act (RCRA) methodologies, support tasks, and Occupational Safety and Health Administration (OSHA) safety standards. The project leader will coordinate services related to the trial burn and will be the primary contact with XYZ Company. Mr. Any Joe of ABC Environmental will act as an independent third-party auditor of the trial burn."

Does the *Project Organization* section of the TBP provide all necessary information?

Example Action: To ensure the highest quality results for stack gas and waste feed samples, it is required that certified laboratories be used to analyze samples. The *Project Organization* section of the trial burn plan does not identify the laboratory responsible for analyzing samples collected during the trial burn. Clark asks Lois to add this observation to the list of items that require additional information from the facility. Clark also notices that the project organization identifies a member of the stack testing company as the QA Officer. Since the QA Officer is not independent of the sample collection team, a potential conflict of interest is identified. Clark notified the U.S. EPA project leader. The U.S. EPA project leader discusses the issue with the facility and suggests the organization chart be revised to make the QA Officer independent of the stack sampling crew. If the facility fails to follow the direction of the U.S. EPA project leader, Lois and Clark now are solely responsible for checking the quality of the data.

Notes:

2.1.1 Gathering General Facility Information

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: The checklist below shows general facility information that must be compiled from the TBP or RBP. A checklist that may assist in compiling a summary of general facility information is included as Exhibit 2.1.1-1, see page 4-8.

Check For:

- ❑ Facility name
- ❑ Facility contact
- ❑ Facility address
- ❑ Facility telephone number
- ❑ U.S. EPA facility identification number
- ❑ Facility employee responsible for trial burn
- ❑ Combustion units to be tested
- ❑ Proposed test schedule
- ❑ Health and safety requirements

Example Situation: Lois calls Charlie of XYZ Company, who is responsible for the trial burn, and informs him that she and Clark will be conducting trial burn oversight.

Lois asks Charlie for details of any health and safety training requirements, and any documents that need to be signed before entry into the facility. Lois inquires about other personnel who will be observing the trial burn and asks Charlie to arrange for a pretest meeting the day before the start of the first test run for all agencies involved. Finally, she asks for directions to the facility.

Example Action: Charlie told Lois that members of the oversight team should carry—at a minimum—safety shoes, safety glasses, ear plugs, hard hat, and Tyvex suits, if required. They should prepare for foul weather conditions, such as rain and high winds. Training in the use of respirators or emergency breathing apparatus is also needed. In addition, Charlie explained which gate to come in and how to check in at the facility.

Notes: _____

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EXHIBIT 2.1.1-1

CHECKLIST FOR
GATHERING GENERAL FACILITY INFORMATION

1	Facility Name:	
2	Facility Identification Number:	
3	Facility Address: Facility Telephone Number:	
4	Facility Contact: Contact Telephone Number:	
5	Trial Burn Coordinator: Organization: Address: Telephone Number:	
6	BIF Units To Be Tested:	
7	Proposed Test Schedule:	
8	Health & Safety Requirements:	

Notes: _____

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2.1.2 Reviewing Proposed Stack Gas Sampling Procedures

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: Check for stack gas sampling information and compare it with standard operating procedures (SOPs) identified in the U.S. EPA Region 6 generic trial burn plan or other applicable guidance documents.

Check For: Verify the adequacy of the following items:

- ❑ Sampling methods
- ❑ Sample port locations
- ❑ Sampling time
- ❑ Sample recovery
- ❑ Sample holding times
- ❑ Sample handling procedures
- ❑ Field analysis of samples
- ❑ QA/QC procedures

Example Situation: Lois reviewed the stack gas sampling procedures portions of the TBP. She noted a table which listed all the stack gas sampling methods and their respective sampling times. While this information appeared accurate, it was not clear which sample would be collected at what time during a test run and from which sample port.

Example Action: Lois contacted the facility to get clarification on which sample port locations would be used to collect the various stack gas samples. She suggested they create a table that lists: (1) stack gas sampling method, (2) sample collection duration, (3) stack port (or ports for isokinetic sampling) to be used during the trial burn, and (4) approximate time of day each sample will be collected.

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2.1.3 Reviewing Waste Feed and Air Pollution Control Device Effluent Sampling Information

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: To carry out a combustion unit evaluation, waste feed and APCS effluent are sampled concurrently with stack gas. Check for the following waste feed and APCS effluent sampling information and compare it with SOPs identified in the U.S. EPA Region 6 generic trial burn plan and applicable guidance documents.

Check For:

- ❑ Number of samples
- ❑ Volume of each sample
- ❑ Frequency of sampling
- ❑ Sample collection, handling, and storage procedures

Example Situation: Clark reads the liquid organic waste sampling section of the TBP, as follows:

"Grab samples of liquid organic waste will be collected every 15 minutes during each run, and each set of grab samples will be composited into a single container in the field. A minimum volume of 50 milliliters (mL) will be collected for each grab sample; the total volume for each composite sample for each run will be about 500 mL. Additionally, volatile organic analysis (VOA) vial samples of liquid organic waste will be collected at the same frequency."

Example Action: The QA/QC procedures handbook recommends that the samplers (1) use specific types of containers for sampling specific waste types, (2) follow preservation techniques, and (3) ensure holding times are met for specific analyses.

Clark determines that the TBP does not address these issues. In reviewing the handbook for QA/QC procedures, he realizes that the facility should prepare a sampling table, or sampling matrix, that clearly lists each sampling location, the waste type, the sample container, preservation techniques, and holding times. Clark notes the importance of this omission and contacts the facility immediately to request this information.

Notes: _____

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2.2 DEVELOPING A HEALTH AND SAFETY PLAN

Regulation: 29 CFR 1910.120
40 CFR 165.5

Guidance: No specific references are applicable to this section of the manual.

Explanation: An HSP is prepared to monitor field personnel and specify routine and emergency safety procedures. Only contractors to the U.S. EPA are required to develop an HSP as part of a trial burn oversight. The HSP should identify all hazards and problems that may be encountered on site and should discuss how they need to be addressed. The HSP should also discuss personnel responsibilities, PPE, health and safety procedures and protocols, decontamination procedures, personnel training, and the type and extent of medical surveillance.

In the chemical manufacturing industry, visitors are often required to complete site-specific health and safety training before entering the facility. Most facilities require that the oversight personnel have completed a 40-hour hazardous materials incident response operations training (see 29 CFR 1910.120 or 40 CFR 165.5).

An example summary of a hazardous substances section of an HSP is included as Exhibit 2.2-1, see page 4-13.

Typical hazards of concern during a TBO include operating on elevated platforms and scaffolds and working near extremely hot surfaces and flammable or explosive materials, usually in a noisy environment. Observers should follow general health and safety procedures of the facility and obey directions of plant personnel in the event of an emergency.

Check For: These elements should be included in an HSP for TBO:

- ❑ Oversight objectives
- ❑ Site description and history
- ❑ Waste management practices
- ❑ Waste types and characteristics
- ❑ Hazards of concern
- ❑ Summary of hazardous substances
- ❑ PPE
- ❑ Site personnel and responsibilities
- ❑ Emergency contacts

- ❑ Medical emergency
- ❑ Site map

Example Section: Lois' contractor for TBO submitted a HSP for review and approval by U.S. EPA.

Example Comments: Lois informed her contractor that EPA does not "approve" contractor HSPs, they simply require that one be in place before field work begins.

Notes: _____

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EXHIBIT 2.2-1

EXAMPLE SUMMARY
HEALTH AND SAFETY PLAN HAZARDOUS SUBSTANCES SECTION

Hazardous Materials Summary (Indicate waste type by category):					
Chemicals:	**Solids:**	**Sludges:**	**Solvents:**	**Oils:**	**TCLP Toxicity:**
Acrylontirile Mixed alcohols Tetrahydrofuran Polytetrahydrofuran Toluene diamine vicinals 1,4-Butanediol Morpholine Amines	Boiler ash				
Notes:					
Fire or Explosion Potential:		High	Medium	Low	Unknown

EXHIBIT 2.2-1 (continued)

EXAMPLE SUMMARY
HEALTH AND SAFETY PLAN HAZARDOUS SUBSTANCES SECTION

Chemicals Present at Site	Highest Observed Concentration (specify units and media)	PEL/TLV specify ppm or mg/m^3	IDLH specify ppm or mg/m^3	Symptoms and Effects of Acute Exposure	Photo-ionization Potential (eV)
Acrylonitrile	5% by volume in gaseous fuels	2 ppm	CARC [85 ppm]	Asphyxia; irritated eyes; headache; sneezing; nausea, vomiting; weakness, light-headedness; skin vesiculation and scaling dermatitis; (CARC)	10.91
Ammonia	5% by volume in gaseous fuels	50 ppm	300 ppm	Eye, nose, throat irritation; dyspnea; bronchospasm; chest pain; pulmonary edema; pink, frothy sputum; skin burns and vesiculation; liquid: frostbite	10.15
Butyl alcohol	40% by weight in liquid fuels	100 ppm	1,400 ppm [LEL]	Irritated eyes, nose, and throat; headache; vertigo; drowsiness; corneal inflammation, blurred vision, lacrimation, photophobia; dermatitis; possible auditory nerve damage, hearing loss; CNS depression	10.04
Diethylamine	10% by weight in liquid fuels	25 ppm	200 ppm	Eye, skin, and respiratory irritation; in animals: myocardial degeneration	8.01
n-Ethylmorpholine	20% by weight in liquid fuels	20 ppm Skin	100 ppm	Eyes, nose, and throat irritation; vision disturbances; corneal edema, blue-gray vision, and colored haloes	

EXHIBIT 2.2-1 (continued)

EXAMPLE SUMMARY
HEALTH AND SAFETY PLAN HAZARDOUS SUBSTANCES SECTION

Chemicals Present at Site	Highest Observed Concentration (specify units and media)	PEL/TLV specify ppm or mg/m^3	IDLH specify ppm or mg/m^3	Symptoms and Effects of Acute Exposure	Photo-ionization Potential (eV)
Morpholine	50% by weight in liquid fuels	20 ppm Skin	1,400 ppm [LEL]	Visual disturbances; nose irritation; cough, and respiratory irritation; eye and skin irritation	8.88
n-Propyl alcohol	40% by weight in liquid fuels	200 ppm	800 ppm	Mildly irritated eyes, nose, and throat; dry cracking skin; drowsiness, headache; ataxia; GI pain; abdominal cramps; nausea, vomiting, and diarrhea; in animals: narcosis	10.22
Tetrahydrofuran	10% by weight in liquid fuels	200 ppm	2,000 ppm	Irritated eyes and upper respiratory system; nausea; dizziness; headache; CNS depression	9.45
o-Toluidine	10% by weight in liquid fuels	5 ppm Skin	CARC [50 ppm]	Irritated eyes; anoxia, and headache; cyanosis; weakness, dizziness, and drowsiness; microhematuria; eye burns; and dermatitis; (CARC)	o 7.44 m, p 7.50

Notes:

A = Air
CA = Cancer
CARC = Carcinogenic
CNS = Central Nervous System
eV = Electron volts
GI = Gastrointestinal
GW = Groundwater
IDLH = Immediately dangerous to life or health
mg/m3 = Milligrams per cubic meter
NA = Not available
NE = None established
LEL = Lower explosive limit
S = Soil
SW = Surface Water
TCLP = Toxicity characteristic leaching procedure
PEL = Permissible exposure limit
TLV = Threshold limit value
PPM = Parts per million
U = Unknown

3.0 CONDUCTING FIELD ACTIVITIES

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: To accomplish valid trial burn and risk burn tests with the highest data quality, the oversight team conducts various field activities. To determine the validity and representativeness of a trial burn, the oversight team should complete an exhaustive observation of all test activities and evaluate conformance with SOPs and techniques identified in the approved TBP, RBP, and QAPP.

During a trial burn, it is common to experience problems associated with process operation, sampling systems, or bad weather conditions. Some problems that may require suspension or cancellation of a test run are listed below:

- Operation of the combustion unit is a hazard to the health and well-being of test personnel, community, or the environment
- Weather conditions that pose a potential to contaminate trial burn samples
- Significant deviations from an approved TBP or RBP that can not be resolved in the field
- Loss of sample during sampling or sample recovery
- Stack gas sampling is interrupted for an extended period of time (more than 4 hours)

Check For: The following specific field activities are conducted during a trial burn oversight:

- ❑ Conducting a pretest meeting
- ❑ Conducting a pretest facility survey
- ❑ Reviewing equipment calibration records
- ❑ Observing stack sampling
- ❑ Observing waste feed and APCS sampling
- ❑ Observing process operations
- ❑ Observing sample recovery
- ❑ Collecting trial burn test information
- ❑ Conducting daily meetings

U.S. EPA Region 6
Center for Combustion Science and Engineering

- ❑ Compiling field documentation
- ❑ Observing audit gas sampling

Sections 3.1 through 3.11 provide a detailed explanation of the above-listed activities.

Example Section: Lois and Clark conduct a pretest meeting with all responsible personnel, including the facility trial burn, stack sampling, and QA/QC coordinators, and emphasize the need for adhering to SOPs and procedures identified in the approved TBP, RBP, and QAPP. Lois and Clark briefly tour the facility to familiarize themselves with process, sampling, and spiking areas. Lois observes the stack, waste feed, and APCS sampling. Clark observes process operating conditions and the sample recovery. Lois and Clark record their observations in field logbooks and on observer checklists. At the end of the day, Lois and Clark meet with all responsible personnel, summarize their observations, provide recommendations, evaluate trial burn progress, and discuss test schedules for the following day.

Example Comments: During a trial burn, the oversight team should carry out their duties quietly and accurately, conversing as little as practical with sampling and process control personnel. Any deviations to or changes from procedures identified in the approved TBP, RBP, and QAPP should be discussed directly and if appropriate, immediately with the facility trial burn coordinator. The oversight team should also avoid touching any sampling or process equipment and assisting in any sampling or handling any sampling equipment during the trial burn.

Notes: _____

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3.1 CONDUCTING A PRETEST MEETING

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: For oversight to be conducted in a cohesive manner, a pretest meeting with the various agencies involved in the trial burn is necessary. All personnel involved in the trial burn must understand that SOPs identified in the approved TBP and RBP must be followed for the test to be successful..

Check For:

- ❑ Explain the role of the oversight team to trial burn personnel
- ❑ Identify the individuals responsible for stack testing, waste feed sampling, APCS sampling, waste feed spiking, and recording process operating data
- ❑ Determine the schedule and plan for trial burn testing
- ❑ Identify any deviations from SOPs indicated in the TBP or RBP

Example Situation: In the pretest meeting, Lois and Clark explain that they will be observing (1) stack gas, waste feed, and scrubber effluent sampling, (2) waste feed spiking, (3) continuous emissions monitoring system (CEMS), and (4) general facility operating procedures. They will also record process operating data. Lois emphasizes that any deviations from or changes to SOPs in the approved TBP or RBP must be discussed and resolved with the oversight team. Lois and Clark also state that the calibration of all equipment involved in testing will be audited during the test.

Example Comments: Because the trial burn involves numerous activities occurring simultaneously, the oversight team should make prior arrangements with appropriate test personnel to observe important activities, such as leak checks, sample recovery, sample field analysis, and sample auditing. To the extent practicable, any problems that may jeopardize the validity of the results should be resolved on site after appropriate personnel have been consulted.

Notes: _____

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3.2 CONDUCTING A PRETEST FACILITY SURVEY

Regulations: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: Before the test begins, personnel should tour the facility, with the facility trial burn coordinator, to familiarize themselves with (1) the facility, (2) sampling locations, (3) procedures being followed, and (4) personnel associated with each specific activity.

Check For:

- ❑ Examine the unit to be tested and observe general process operating procedures
- ❑ Inspect the APCS associated with the unit to be tested and observe general operating procedures
- ❑ Identify stack gas, waste feed, and APCS effluent sampling areas
- ❑ Whether the stack includes a rain hat or an obstruction to gas flow
- ❑ Sketch the stack gas sampling location
- ❑ Examine the sampling platform or scaffold
- ❑ Match the sampling trains with the appropriate sampling ports and become familiar with the order the trains will be employed
- ❑ Inspect the stack gas sample recovery area and the field laboratory, if any
- ❑ Determine the method and location of sample storage and labeling procedures
- ❑ Identify persons responsible for monitoring process operating conditions and recording them at regular intervals
- ❑ Identify stack sampling personnel and their individual responsibilities
- ❑ Identify waste feed and APCS sampling personnel and their individual responsibilities

Temporary scaffolding is often used during stack sampling.

Example Situation: Lois and Clark briefly tour the combustion unit, generally observing the process operations and ensuring that all monitoring equipment and sampling locations are acceptable, functional, and calibrated when necessary. Lois and Clark meet all personnel involved in the trial burn and identify their individual responsibilities.

Example Comments: The pretest field survey presents an opportunity to become familiar with the BIF unit and to meet key participants in the trial burn. It is recommended that observers make efforts to obtain answers for questions before the trial burn begins. This minimizes interfering with test personnel during testing when their attention should be focused on their individual responsibilities.

Notes: _____

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3.3 REVIEWING EQUIPMENT CALIBRATION RECORDS

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

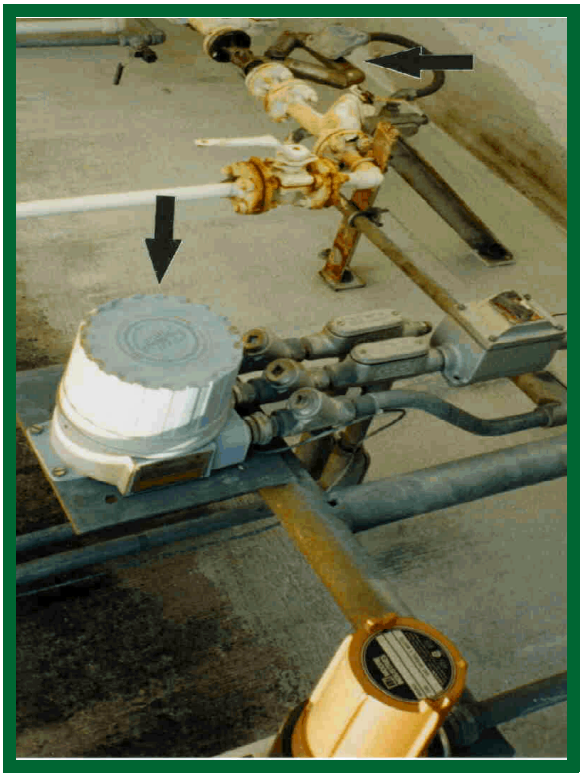
Explanation: Calibration of all process and sampling equipment is required to ensure the validity of data collected in the field. An audit of equipment calibration records is a critical component of trial burn or risk burn oversight. Obtain and review calibration records of all items in the "Check For" section. It is acceptable to request that the facility provide to the permit writer records of all completed calibrations one to two weeks before testing begins. The remainder of all calibration records should be available for review the day before testing begins.

Check For:

- ❑ Stack sampling equipment
- ❑ Feed spiking equipment
- ❑ Facility process control equipment
- ❑ CEMS
- ❑ Field laboratory instrumentation

These items are further explained in Subsections 3.3.1 through 3.3.5.

Example Situation: During the pretest briefing, Lois and Clark ask all organizations involved in the trial burn to provide a list of calibration records identified in Subsections 3.3.1 through 3.3.5 and a detailed description of maintenance procedures.



This combination mass flow meter/controller/ transmitter is often used to regulate, measure, and monitor the mass flow rate of hazardous waste fuel. Calibration records should be obtained for all flow meters.

Example Action: Stack sampling equipment are usually calibrated before stack testing and after testing completion. Lois and Clark ask ABC Environmental to provide post-calibration records of all sampling equipment at the end of testing. Comparing pretest and post-test calibration records provides important information on the quality of the field data collected.

Notes: _____

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3.3.1 Reviewing Stack Sampling Equipment Calibration Records

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: Obtain calibration records of stack sampling equipment identified in the following checklist.

Check For:

- ❑ Pitot tubes
- ❑ Differential pressure gauges
- ❑ Temperature indicators
- ❑ Dry gas meters
- ❑ Probe nozzles
- ❑ Rotameters
- ❑ Barometer

Example Section: A blank digital temperature indicator calibration form is included as Exhibit 3.3.1-1, see page 4-25.

Example Comments: Manufacturers of most stack sampling equipment provide specific troubleshooting, calibration, and maintenance procedures. If records provided by the stack sampling company are inadequate, the oversight team should request then review the manufacturer-supplied literature for calibration and maintenance procedures.

Notes: _____

_____

_____

This rotameter arrangement is often used in conjunction with the Method 0040 sampling train to monitor vacuum flow rate. Oversight personnel should ensure that flow remains constant by periodically checking the level of the rotameter during the trial burn test.

EXHIBIT 3.3.1-1

BLANK DIGITAL TEMPERATURE INDICATOR CALIBRATION FORM

DIGITAL TEMPERATURE INDICATOR NO. _____
CALIBRATION DATA

Date: _____

Medium	Time	Mercury Temperature	DTI (°F)
Ambient air			
Ice bath			
Boiling water			
Oven			
Oven			
Oven			
Oven			

Note: DTI = Digital Temperature Indicator

Meter Adjusted? Yes _____ No _____

_____
Signature of Calibrator

3.3.2 Reviewing Feed Spiking Equipment Calibration Records

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: Feed spiking equipment usually consists of a pump, a flow meter, a data acquisition control system (DACS), and feed spiking chemicals. It is essential to audit calibration and maintenance records of the spiking equipment to ensure accurate spiking of the waste feed.

Check For:

- ❑ Pump and flow meter calibration records
- ❑ Pump and flow meter maintenance procedures
- ❑ Certificates of analysis for spiking chemicals

Example Section: Attached are a calibration form for a spiking pump flow meter system (Exhibit 3.3.2-1, see page 4-28) and a certificate of analysis for a spiking chemical (Exhibit 3.3.2-2, see page 4-29).

Waste feed sampling apparatus should be inspected to identify all equipment associated with waste feed spiking.

Example Comments: Waste feed spiking companies work on multiple projects in a congested schedule and, therefore, increases the potential to overlook calibration and maintenance of the equipment. It is important to verify whether equipment was recently calibrated for the project at hand.

Exhibit 3.3.2-1 (see page 4-28) should include the signatures of the field technicians and field manager. Also, the significance of the slope and intercept values should be presented in the equipment operating manual. The units (for example, pounds per hour [lb/hr] or gallons per minute [gpm] or percent input value) for the flow measurements should be included in the table.

Notes:

EXHIBIT 3.3.2-1

SPIKING PUMP CALIBRATION FORM

CALIBRATION FORM

Date: 12/03/96

Pump #: 11

Run Number	1	2	3
Scale	4.06	4.03	4.02
Flow Meter	4.00	4.00	4.00
DACS	4.05	4.03	4.00
% Deviation	Run 1	Run 2	Run 3
Scale vs FlowMeter			
Scale vs DACS			

Slope: 33.74321

Intercept: -99.8772

Approved by: _____

Field Manager: _____

NOTES:

DACS = Data acquisition control system

EXHIBIT 3.3.2-2

SPIKING CHEMICAL CERTIFICATE OF ANALYSIS

CERTIFICATE OF ANALYSIS

Customer:	ABC Company Somewhere, USA		
Product:	AMSPERSE ENV 280-1 Sodium Dichromate Solution		
Batch #:	4458	P.O. #:	B3-97012.01

RESULTS OF ANALYSIS

Chromium, CR+6	0.4%
Amount, lbs.	900#

ISSUED BY: Ann Alysis
Lab Tech

3.3.3 Reviewing Process Control Equipment Calibration Records

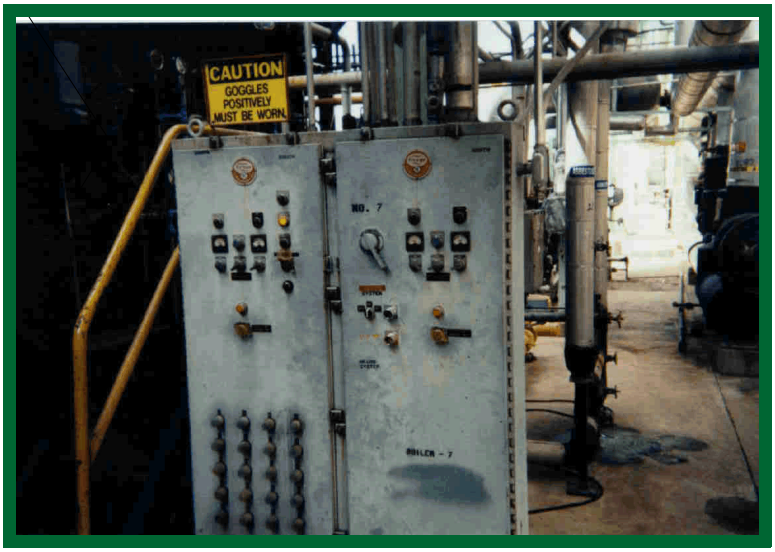
Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: The operation of a combustion unit is usually controlled by numerous pieces of process control equipment. To ensure that data collected during a trial burn are precise and accurate, the oversight team should audit calibration and maintenance records of all relevant process control equipment before the start of testing. Verify calibration and maintenance records of the items in the following check list:

Check For:

- ❑ Waste feed flow meters
- ❑ Atomization air pressure transmitters
- ❑ Pyrometers
- ❑ Differential pressure gauges across APCSs
- ❑ pH meters
- ❑ Oxidation and reduction potential meters
- ❑ Integral orifice meters
- ❑ Thermocouples and temperature indicators



Local control panels often include meters and local data readouts that should also have calibration records.

Example Section: Attached are a blank calibration form for a pH meter (Exhibit 3.3.3-1, see page 4-32) and a calibration report for an infrared thermometer (Exhibit 3.3.3-2, see page 4-33).

Also attached are completed control room and field loopcheck and inspection sheets: Exhibits 3.3.3-3 (see page 4-34), 3.3.3-4 (see page 4-37), and 3.3.3-5 (see page 4-40).

Example Comments: Instruments should be calibrated at multiple measurement points evenly spaced over a range. When practical, at least one calibration point should approximate levels anticipated in the actual test measurement.

Exhibit 3.3.3-1 (see page 4-32) should include the date of calibration. It is also helpful to include the instrument tag number or model number to be more specific than simply meter number. In addition, a description of the instrument's location, for example pH meter in acid gas scrubber number 1, would aid in understanding how and where the instrument is used.

Almost all of the values recorded on the Exhibits 3.3.3-3 (see page 4-34), through 3.3.3-5 (see page 4-40), calibration sheets reflect acceptable expected values. These values indicate that the instrument is operating within recommended limits. It is helpful to review the instrument operating manuals to better understand the calibration procedures.

As seen on Exhibit 3.3.3-5, see page 4-42, Field Inspection Sheet, items 1, 2, and 3 are circled and unanswered. The significance of these omissions is unclear. The facility should explain the situation surrounding these omissions and determine whether the calibration results are suspect.

Notes: _____

_____

_____

EXHIBIT 3.3.3-1
EXAMPLE PROCESS CONTROL EQUIPMENT CALIBRATION FORM

pH METER NO. _____

CALIBRATION FORM

Date: _____

Run No.	Measured Value	pH—Buffer 1

Meter Adjusted? Yes____No_____

Run No.	Measured Value	pH—Buffer 2

Meter Adjusted? Yes____No_____

Run No.	Measured Value	pH—Buffer 3

Meter Adjusted? Yes____No_____

Signature of Calibrator:_____

EXHIBIT 3.3.3-2
INFRARED THERMOMETER CALIBRATION REPORT

CERTIFICATE OF CALIBRATION
FOR
INFRARED THERMOMETER

Model MR-OR05-32F-1-1/0-0-0 **Test Report No.** RD-106965
Serial No. 26009 **Date** February 5, 1997

INDICATED TEMPERATURE VS BLACKBODY STANDARD TEMPERATURE

Blackbody Temperature T_{TRUE} (°F or °C)	Indicated Temperature T_{IND} (°F or °C)	Correction Factor T_{CORR} (°F or °C)	Thermometer Output (If Applicable)
1800°F	1800°F	0°F	NA
2100°F	2098°F	2°F	NA
2400°F	2398°F	2°F	NA
2800°F	2799°F	1°F	NA
3200°F	3200°F	0°F	NA
°F	°F	°F	NA

NOTES: Indicated Temperature (T_{IND}) is temperature displayed on built-in meter of thermometer.
$T_{TRUE} = T_{IND}$ 1 T_{CORR}

EXHIBIT 3.3.3-3
EXAMPLE THERMOCOUPLE TEMPERATURE TRANSMITTER CALIBRATION RECORD

CONTROL ROOM LOOPCHECK SHEET
THERMOCOUPLE TEMPERATURE TRANSMITTER

Tag #	Interface I/O	Calib.	Range	T/C Type
TT-41944	AI-I7623	0-1550	Deg. C	S

Fail Position
Upscale

Description: BNR-410 Combustion Chamber Temperature #1

✓ 1. Call up "AIV" (Table 22) on Fox & Dog. Record the "AIV" values at the applied inputs.

Input Signal	AIV (Table 22) Fox	AIV (Table 22) Dog	Expected AIV values
4 ma	1.2	1.2	1.2
12 ma	3.6	3.6	3.6
20 ma	6.0	6.0	6.0

The voltages on the Fox & Dog should not differ by more than 0.05 volts. The voltage on the "Left" computer, with 4 ma applied, should be 1.2 volts +/- .01 volts.

**Notify the owner's representatives if either of these tolerances are exceeded.

✓ 2. Call up the "AI" on one of the computers and record the "AI" reading 28.

✓ 3. Have the field disconnect one sensor wire from transmitter. Verify the proper sensor failure mode (HI/LO).

✓ 4. The field will simulate an input to the transmitter as given below. Record the "AI" (Table 20) values and the "AIV" (Table 22) values for the applied inputs.

Input (% of range)	AI Eng. Units	Expected AI values	AIV values
0%	0	0 DEG. C	0
50%	774	775 DEG. C	774
100%	1550	1550 DEG. C	1550

✓ 5. When the sensor wires are reconnected, the "AI" should read the same as the "AI" recorded in step #2.

Sign/Date: Cal E. Brator 8/4/97

EXHIBIT 3.3.3-3 (Continued)
EXAMPLE THERMOCOUPLE TEMPERATURE TRANSMITTER CALIBRATION RECORD

FIELD LOOPCHECK SHEET
THERMOCOUPLE TEMPERATURE TRANSMITTER

Tag #	Interface I/O	Calib.	Range	T/C Type
TT-41944	AI-I7623	0-1550	Deg. C	S

Fail Position
Upscale
_____

Description: BNR-410 Combustion Chamber Temperature #1

✓ 1. Hook up communicator to transmitter & check/program:
Tag #: _____
Description: _____
Range: _____
Message (Mod5 I/O): _____
Sensor type: _____

✓ 2. Place the transmitter in the "loop test" mode and send 4, 12 & 20 ma signals to the CR. Have CR document the "AIV" (Table 22) on both computers while at 4, 12, & 20 ma. Exit the "test" mode and return the transmitter to the "normal operating" mode.

✓ 3. Call up the "PV" on the communicator. The "PV" should indicate the current process temperature and should agree with the CR. Record the "PV": *30.6*.

✓ 4. Disconnect one sensor wire from the transmitter. The transmitter should go into its sensor failure mode. Verify with the CR. If the transmitter fails in the wrong direction, move the failure mode jumper to the correct position. Disconnect the other sensor wire from the transmitter.

✓ 5. Hook up a T/C temperature simulator to the transmitter. Simulate 0, 50, & 100% of its range. Have the CR check and document the engineering units and "AIV" values.

✓ 6. Reconnect the sensor wires to transmitter. Verify indication is the same as recorded in step #3.

✓ 7. Secure cover on transmitter.

Sign/Date: *Cal E. Brator 8/4/97*

EXHIBIT 3.3.3-3 (Continued)
EXAMPLE THERMOCOUPLE TEMPERATURE TRANSMITTER CALIBRATION RECORD

FIELD INSPECTION SHEET

PROJECT: *F-410*

TAG # : *TT-41944* _____ _____
I/O# : *AI-7623* _____ _____

Place a "yes" or "no" by each applicable item after verifying proper compliance. Place "N/A" by each non-applicable item.

Yes 1. All equipment is tagged and labeled properly as per drawings and job instructions.

Yes 2. Tag items installed in proper location as per drawings. (If drawings not available have Company Rep. locate and identify tag items.) _____ <If so put Company Rep. Initials.

Yes 3. Tag items installed as per details (process, conduit, air supply, support, wiring, etc.) and job instructions issued with the construction package. (Check if package is available).

NA 4. All loose wires and or abandoned lightning protection are removed or protected with electrical tape so as to prevent electrical short.

NA 5. Tag item installed properly with regard to flow direction.

Yes 6. Tag items securely installed (bolts & nuts tight, proper gaskets in the proper places, valves, and plugs made up, instrument stand secure, tube fittings tight, etc.)

Yes 7. Conduit and flex made up so that water cannot drain from conduit into equipment.

NA 8. Air supply regulators set as per field device requirements.

Yes 9. Sensor is bottomed-out in thermowell.

Yes 10. All conduit fittings are covered.

NA 11. Control circuits & power circuits have been tested as per labor bill instructions.

Sign & Date: *Cal E. Brator 8/4/97*

EXHIBIT 3.3.3-4
EXAMPLE DIFFERENTIAL PRESSURE FLOW TRANSMITTER CALIBRATION RECORD

CONTROL ROOM LOOPCHECK SHEET
FLOW TRANSMITTER (DIFFERENTIAL PRESSURE)

Tag #	Interface I/O	Calib.	Range	Characteristic
FT-41991	AI-7604	0-52.18"	H20	SQ. Foot

Flow Range	Fail Position
0-9340 CFM	Upscale

Description: AIR FLOW FROM BLOWER 410 TO F-410

NOTE: Input in transmitter memory under message - 0-43,500 #/HR

✓ 1. Call up "AIV" (Table 22) on Fox & Dog. Record the "AIV" values at the applied inputs.

AIV
(Table 22)

Input Signal	Fox	Dog	Expected AIV values
4 ma	1.2	1.2	1.2
12 ma	3.6	3.6	3.6
20 ma	6.0	6.0	6.0

The voltages on the Fox & Dog should not differ by more than 0.05 volts. The voltage on the "Left" computer, with 4 ma applied, should be 1.2 volts +/- .01 volts.

**Notify the owner's representatives if either of these tolerances are exceeded.

✓ 2. Call up the "AI" on one of the two computers. The field will apply inputs to the transmitter as given below. Record the "AI" (Table 20) values and the "AIV" (Table 22) values for the applied inputs.

Input (% of range)	AI Eng. Units	Expected A1 values	AIV values
0%	0	0	1.2
50%	6600	6600	3.6
100%	9340	9340	6.0

✓ 3. Have the field place the transmitter back in service.
Could not get valves to line up.
Sign/Date: Cal E. Brator 8/4/97

EXHIBIT 3.3.3-4 (Continued)
EXAMPLE DIFFERENTIAL PRESSURE FLOW TRANSMITTER CALIBRATION RECORD

FIELD LOOPCHECK SHEET
FLOW TRANSMITTER (DIFFERENTIAL PRESSURE)

Tag #	Interface I/O	Calib.	Range	Characteristic
FT-41944	AI-7604	0-52.18"	H20	SQ. Root

Flow Range	Fail Position
0-9340 CFM	Upscale

Description: AIR FLOW FROM BLOWER 410 TO F-410

NOTE: Input in transmitter memory under message - 0-43,500 #/HR

✓ 1. Hook up communicator to transmitter & check/program:
Tag #: *FT-41991*
Description: *Air Flow from Blower*
Range: _____
Message (Mod5 I/O): _____
Output characteristics: _____

✓ 2. Place the transmitter in the "loop test" mode and send 4, 12 & 20 ma signals to the CR. Have CR document the "AIV" (Table 22) on both computers while at 4, 12, & 20 ma. Exit the "test" mode and return the transmitter to the "normal operating" mode.

✓ 3. Block and bleed both sides of the transmitter. The "PV" should indicate "0".

✓ 4. Pump up transmitter to 50% & 100% of its range and have the CR check and document the engineering units and "AIV" values.

NA 5. Close and plug bleed valves and open block valves to process.

✓ 6. Verify the proper position of the failure mode jumper.

✓ 7. Secure covers on transmitter.

Sign/Date: *Cal E. Brator 8/4/97*

1. *No tubing tray*
2. *No tubing clips for over 5" run*
4. *Could not reach main block valves to open to process*

EXHIBIT 3.3.3-4 (Continued)
EXAMPLE DIFFERENTIAL PRESSURE FLOW TRANSMITTER CALIBRATION RECORD

FIELD INSPECTION SHEET

PROJECT: *F-410*

TAG # : *FT-41991* _____ _____
I/O# : *AI-7604* _____ _____

Place a "yes" or "no" by each applicable item after verifying proper compliance. Place "N/A" by each non-applicable item.

✓	1.	All equipment is tagged and labeled properly as per drawings and job instructions.
✓	2.	Tag items installed in proper location as per drawings. (If drawings not available have Company Rep. locate and identify tag items.) _____ <If so put Company Rep. Initials.
✓	3.	Tag items installed as per details (process, conduit, air supply, support, wiring, etc.) and job instructions issued with the construction package. (Check if package is available).
✓	4.	All loose wires and or abandoned lightning protection are removed or protected with electrical tape so as to prevent electrical short.
✓	5.	Tag item installed properly with regard to flow direction.
_____	6.	Tag items securely installed (bolts & nuts tight, proper gaskets in the proper places, valves, and plugs made up, instrument stand secure, tube fittings tight, etc.)
_____	7.	Conduit and flex made up so that water cannot drain from conduit into equipment.
NA	8.	Air supply regulators set as per field device requirements.
NA	9.	Sensor is bottomed-out in thermowell.
✓	10.	All conduit fittings are covered.
_____	11.	Control circuits & power circuits have been tested as per labor bill instructions.

Sign & Date: *Cal E. Brator 8/4/97*

EXHIBIT 3.3.3-5
EXAMPLE MISCELLANEOUS FLOW TRANSMITTER CALIBRATION RECORD

CONTROL ROOM LOOPCHECK SHEET
MISCELLANEOUS FLOW TRANSMITTER (SMART MAGMETER, VORTEX, ETC.)

Tag #	Interface I/O	Calib. Range	Characteristic
FT-41801	AI-7601	0-1400 #Per/Hr.	Linear

Flow Range	Manufacturer	Type
0-1400 #Per/Hr.	Rosemount	Micro-Motion

Description: FUEL GAS FLOW TO BNR-410

✓ 1. Call up "AIV" (Table 22) on Fox & Dog. Record the "AIV" values at the applied inputs.

Input Signal	AIV (Table 22) Fox	AIV (Table 22) Dog	Expected AIV values
4 ma	*1.2*	*1.2*	1.2
12 ma	*3.6*	*3.6*	3.6
20 ma	*6.0*	*6.0*	6.0

The voltages on the Fox & Dog should not differ by more than 0.05 volts. The voltage on the "Left" computer, with 4 ma applied, should be 1.2 volts +/- .01 volts.

**Notify the owner's representatives if either of these tolerances are exceeded.

✓ 2. Call up the "AI" on one of the two computers. The field will apply inputs to the transmitter as given below. Record the "AI" (Table 20) values and the "AIV" (Table 22) values for the applied inputs.

Input (% of range)	AI Eng. Units	Expected AI values	AIV values
0%	*0*	0#PER/HR	*1.2*
50%	*700*	700#PER/HR	*3.6*
100%	*1400*	1400#PER/HR	*6.0*

✓ 3. Have the field place the transmitter back in service.

Sign/Date: *Cal E. Brator 8/4/97*

EXHIBIT 3.3.3-5 (Continued)
EXAMPLE MISCELLANEOUS FLOW TRANSMITTER CALIBRATION RECORD

FIELD LOOPCHECK SHEET
THERMOCOUPLE TEMPERATURE TRANSMITTER

Tag #	Interface I/O	Calib.	Range	Characteristic
FT-41801	AI-7601	0-1400	#PER/HR	Linear

Flow	Range	Manufacturer	Type
0-1400	#Per/Hr.	Rosemount	Micro-Motion

Description: FUEL GAS FLOW TO BNR-410

NOTE: Do Not perform this check until all the software parameters have been entered and/or verified in the field device.

✓ 1. If the device is field-powered, verify that the power source location on the appropriate documentation is correct by turning off the power at that location. Turn power back on after verification is complete.

✓ 2. Hook up communicator to transmitter and verify:

Tag #: _____
Description: _____
Range: _____

✓ 2. Place the transmitter in the "loop test" mode and send 4, 12 & 20 ma signals to the CR. Have CR check and document the "AIV" (Table 22) values on both computers while at 4, 12, & 20 ma. Have the CR check and document the engineering units on one computer and the "AIV" on the other while at 4, 12, & 20 ma. Exit the "test" mode and return the transmitter to the "normal operating" mode.

✓ 4. Secure cover on transmitter.

Sign/Date: *Cal E. Brator 8/4/97*

EXHIBIT 3.3.3-5 (Continued)
EXAMPLE MISCELLANEOUS FLOW TRANSMITTER CALIBRATION RECORD

FIELD INSPECTION SHEET

PROJECT: *F-410*

TAG # : *FT-41801* _____ _____
I/O# : *AI-7601* _____ _____

Place a "yes" or "no" by each applicable item after verifying proper compliance. Place "N/A" by each non-applicable item.

❍ 1. All equipment is tagged and labeled properly as per drawings and job instructions.

❍ 2. Tag items installed in proper location as per drawings. (If drawings not available have Company Rep. locate and identify tag items.) _____ <If so put Company Rep. Initials.

✓ 3. Tag items installed as per details (process, conduit, air supply, support, wiring, etc.) and job instructions issued with the construction package. (Check if package is available).

✓ 4. All loose wires and or abandoned lightning protection are removed or protected with electrical tape so as to prevent electrical short.

✓ 5. Tag item installed properly with regard to flow direction.

✓ 6. Tag items securely installed (bolts & nuts tight, proper gaskets in the proper places, valves, and plugs made up, instrument stand secure, tube fittings tight, etc.)

✓ 7. Conduit and flex made up so that water cannot drain from conduit into equipment.

NA 8. Air supply regulators set as per field device requirements.

NA 9. Sensor is bottomed-out in thermowell.

✓ 10. All conduit fittings are covered.

❍ 11. Control circuits & power circuits have been tested as per labor bill instructions.

Sign & Date: *Cal E. Brator 8/4/97*

3.3.4 Reviewing Continuous Emission Monitoring System Calibration Records

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: CEMS do not operate accurately and reliably without well-planned and frequent maintenance. To ensure that data collected during a trial burn are of high quality, the maintenance oversight team should audit the certification and calibration records of all CEMS.

Check For:

- ❑ Latest CEMS certification report
- ❑ Automatic daily calibration records
- ❑ Periodic manual calibration records
- ❑ Certificates of analysis of calibration gases

Example Section: Performance specifications of CEMS are defined below. In addition, a sample multipoint CEMS calibration data sheet (Exhibit 3.3.4-1, see page 4-45) and examples of performance specification test results (Exhibit 3.3.4-2, see page 4-46) and relative accuracy test results (Exhibit 3.3.4-3, see page 4-47), are also attached.

- Calibration Drift—difference in the CEMS output reading from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place
- Calibration Error—difference between the concentration indicated by the CEMS and the known concentration of the cylinder gas
- Relative Accuracy—a comparison of the CEMS response to a value measured by a reference method (that is, Method 3, 3a, 10, 10A, or 10B) described in 40 CFR Part 60.
- Response Time—time interval between the start of a step change in system input and the time when recorder displays 95 percent of the input value.

Calibration records should be collected for all CEMS, including units such as this carbon monoxide and oxygen monitoring system.

Example Comments: CEMS calibration should not drift or deviate from the reference value of the reference gas cylinder, gas cell, or optical filter by more than 2.5 percent of the span value. Relative accuracy of the CEMS should be no greater than 20 percent of the mean value of the reference method test data in terms of units of the emission standard or 10 percent of the applicable standard, whichever is greater. The response time for CO and O_2 monitors should not exceed 2 minutes.

Notes: _____

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EXHIBIT 3.3.4-1

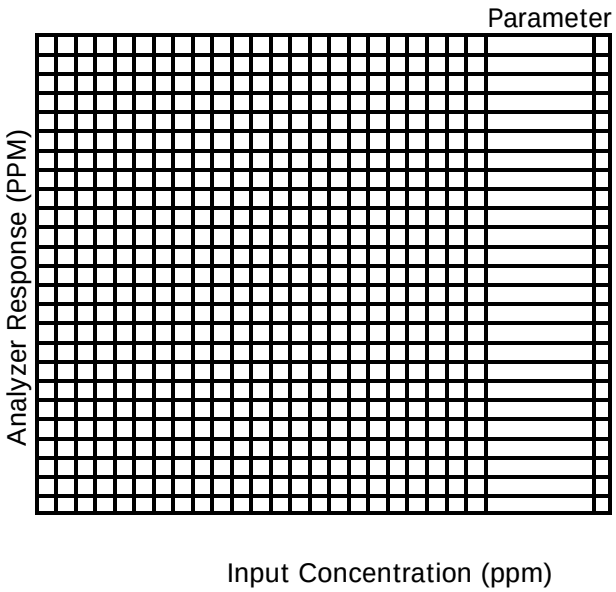
EXAMPLE CEMS MULTIPOINT CALIBRATION DATA SHEET

Site _____
Engineer _____
Date (hour) _____

Instrument model _____
Instrument S/N _____
Instrument range _____

Standards _____
_____
_____

Unadjusted: Recalibrate if Response Greater Than ± 10 Percent



Input	Response	%Difference	RF (Input ÷ Response)	Overall Mean RF

Adjusted: Adjust Analyzer Response at 40 Percent of Full Scale

Comments RF is response factor. The instrument linearity is acceptable if the RF at each point is within 2.5 percent of overall mean RF. A linearity check calibration is completed before the system is first placed into operation.

EXHIBIT 3.3.4-2

EXAMPLE PERFORMANCE SPECIFICATION TEST RESULTS

SUMMARY OF RESULTS

RELATIVE ACCURACY, CALIBRATION DRIFT, CALIBRATION ERROR AND RESPONSE TIMES

Parameter	System	Relative Accuracy	Maximum Calibration Drift		Calibration Error			Response Time	Allowable			
			Low Level	High Level	Low Level	Mid Level	High Level		Relative Accuracy	Calibration Drift	Calibration Error	Response Time
Carbon Monoxide	1	5.33%	1 ppm	8 ppm	0.47 ppm	0.67 ppm	2.33 ppm	1.42 min	10.0% or 10 ppm	15 ppm	25 ppm	2 min.
Oxygen	1	3.27%	0.1% 0^2	0.4% 0_2	0.04% 0_2	0.11% 0_2	0.08% 0_2	1.48 min.	20%	0.5% 0_2	0.5% 0_2	2 min.
Carbon Monoxide	2	1.44%	1 ppm	8 ppm	0.87 ppm	2.00 ppm	8.33 ppm	1.22 min.	10.0% or 10 ppm	16 ppm	25 ppm	2 min.
Oxygen	2	3.12%	0.2% 0_2	0.4% 0_2	0.05% 0_2	0.19% 0_2	0.27% 0_2	1.29 min.	20%	0.5% 0_2	0.5% 0_2	2 min.

COMMENTS: A calibration drift test is completed to demonstrate the stability of CEMS calibration over a period of time. A calibration error test is conducted to document the accuracy and linearity of CEMS over the entire measurement range. A risk assessment test is conducted to verify the representativeness and accuracy of CEMS measurements.

EXHIBIT 3.3.4-3

EXAMPLE RELATIVE ACCURACY TEST RESULTS

SUMMARY OF RESULTS

Carbon Monoxide Monitor Certification

Run Number	Date	Time	Reference Method ppm CO	Monitor Reading ppm CO	Difference ppm CO
1	08/01/96	0854-0915	66.3	63.41	-2.89
2	08/01/96	0927-0948	61.5	58.64	-2.86
3	08/01/96	0959-1020	65.0	62.22	-2.78
4	08/01/96	1030-1051	42.3	39.71	-2.59
5	08/01/96	1134-1155	57.6	54.57	-3.03
6	08/01/96	1206-1227	56.0	52.89	-3.11
7	08/01/96	1238-1259	56.9	54.04	-2.86
8	08/01/96	1311-1332	57.0	54.06	-2.94
9	08/01/96	1343-1404	41.9	39.33	-2.57
Average			56.06	53.21	-2.85

Standard Deviation = 0.18 ppm CO

Confidence Coefficient = 0.14 ppm CO

I Mean Difference I + Confidence Coefficient = 2.99 ppm CO

$$\text{Relative Accuracy} = \frac{\text{I Mean Difference I + Confidence Coefficient}}{\text{Average Reference Method}} \times 100 = 5.39\%$$

3.3.5 Reviewing Field Laboratory Instrumentation Calibration Records

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: A field laboratory usually consists of numerous analytical reagents, analytical balances, certified gases, and field GC/FID. Component 5 contains detailed checklists and an explanation of a laboratory audit. While Component 5 focuses on off-site laboratories, many of the audit techniques can be used for field laboratories as well.

Check For:

- ❑ Certificates of analysis
- ❑ Calibration records
- ❑ Maintenance procedures

Example Section: Please refer to Component 5—How to Conduct a Laboratory Audit.

Example Comments: Please refer to Component 5—How to Conduct a Laboratory Audit.

Notes: _____

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3.4 OBSERVING STACK SAMPLING ACTIVITIES

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

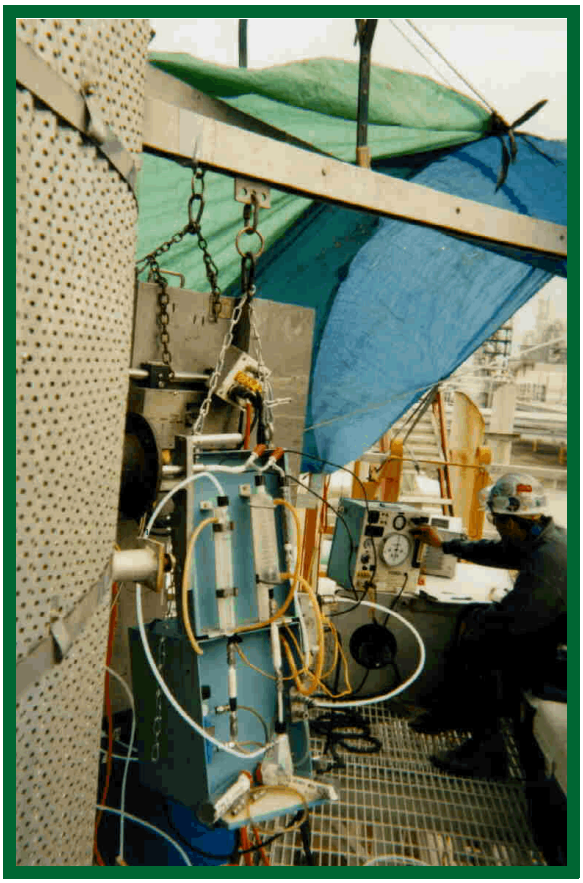
Explanation: Stack gas sampling constitutes a substantial portion of a trial burn or risk burn test. The performance of the trial burn depends significantly on how stack sampling is conducted. To ensure the highest data quality, the facility should conduct stack sampling in strict accordance with SOPs identified in guidance documents and the approved TBP, RBP, and QAPP.

Check For:

- ❑ Whether the sampling ports are properly cleaned before the test run to minimize the chance of sampling-deposited material
- ❑ Whether the probe and filter heating systems measure up to 120 ± 14 degrees Celsius (°C) or 248 ± 25 degrees Fahrenheit (°F) before sampling begins
- ❑ Whether the probe and pitot tube are positioned to point directly into the direction of stack gas flow
- ❑ Whether the openings around the probe and port hole are blocked off during sampling to prevent an unrepresentative dilution of the gas stream

Sections 3.4.1 through 3.4.10 describe, in detail, the following specific sampling issues that should be carefully evaluated during a trial burn:

- ❑ Sampling port location
- ❑ Cyclonic flow check
- ❑ Traverse point calculations
- ❑ Sampling train assembly
- ❑ Leak checks prior to sampling
- ❑ Sampling train temperatures
- ❑ Field data logsheet
- ❑ Leak checks during sampling
- ❑ Sampling train disassembly
- ❑ Sampling checklists



Method 0030 sampling train console and sorbent tube. The sampling train is used in collection of samples for VOC analysis and includes two sorbent tubes: one containing Tenax resin, and the other containing Tenax resin and petroleum-based charcoal. The observer should inspect each train to ensure proper construction.

This photograph shows a Method 0050 sampling train being pushed into the sample port. The observer should check to ensure that the probe is properly positioned at each sampling location.

Example Situation: Lois and Clark observe that temporary scaffolding erected for the trial burn test is too small to allow them to watch stack sampling from the scaffold platform safely and comfortably. What should they do?

Example Action: Lois notes that the top of a nearby baghouse is nearly at the same level as the sampling platform. The top of the baghouse is surrounded by a railing and would allow the observers to watch the testing from about 10 feet away. Lois requests approval from the facility to use the baghouse as an observation platform so that the team may observe sampling activities safely without being in the way.

Notes: _____

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3.4.1 Reviewing Sampling Port Location

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: For a representative measurement of the pollutant emission rate, a sampling port should usually be located at least eight stack or duct diameters downstream and two diameters upstream from any flow disturbance—such as a bend, expansion, or contraction in the stack or from a visible flame. This rule of thumb is known as the "eight-and two-diameter criterion."

Check For:

- ❑ Stack diameter
- ❑ Distance from sampling port to the nearest disturbance in upstream and downstream directions
- ❑ Process unit diagram

This stack measures 4.7 square meters (50 square feet in cross-sectional area and 18 meters [60 feet] high). The oversight team should verify the dimensions of each stack.

Stack sampling ports on this horizontal duct are placed at a 90 degree angle to each other.

Example Section: In the pretest briefing, Lois and Clark were provided with a stack diagram by the stack sampling crew leader. Use the attached stack diagram (Exhibit 3.4.1-1, see page 4-55) and determine whether stack gas sampling from the indicated sampling port is acceptable.

Example Action: The team should ensure that the sampling site is selected at a location that aids in collection of a representative sample, by verifying Method 1 of Test Methods, Appendix A, 40 CFR Part 60. Clark reads the stack diagram and collects the following data:

Stack inside diameter:	96 inches
Port location upstream from disturbance:	253 inches
Port location downstream from disturbance:	315 inches

Clark determines that the sampling site is located 2.64 stack diameters upstream and 3.28 stack diameters downstream from a flow disturbance and that it does not satisfy the eight-stack-diameter downstream criterion. Clark reviews Method 1 and ascertains that the method also allows selection of an alternate location at least

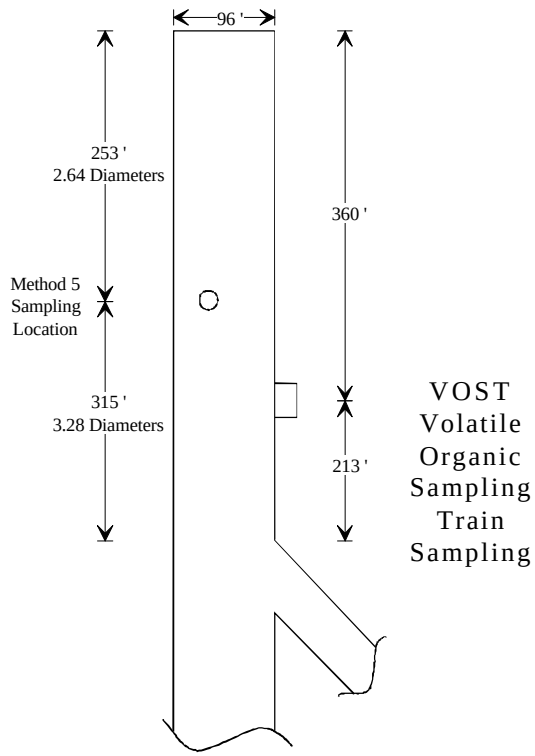
one-half stack diameter upstream and two stack diameters downstream from any flow disturbance, if necessary.

The number of sampling ports in a stack varies, based on stack inside diameter and stack wall thickness. Generally, if the stack identification and stack wall thickness plus 6 inches is less than 10 feet, then two ports (located 90 degrees apart) are used. If the stack inside diameter and stack wall thickness plus 6 inches is more than 10 feet, then four ports (located 90 degrees apart) are used.

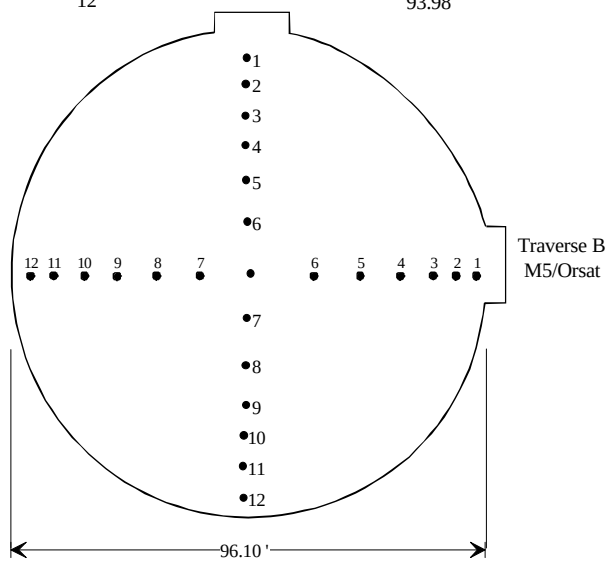
Notes:

EXHIBIT 3.4.1-1

EXAMPLE STACK DIAGRAM



Traverse Point	Distance from Inside Wall (inches)
1	2.02
2	6.43
3	11.33
4	15.99
5	24.00
6	34.18
7	61.82
8	72.00
9	79.01
10	84.67
11	89.57
12	93.98



3.4.2 Reviewing Cyclonic Flow Measurements

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: To measure the pollutant emission rate, a sampling port should be located at a point where the gas flow is not turbulent so that a representative stack gas sample can be collected.

Check For:

- ❑ Cyclonic flow check data sheet
- ❑ Cyclonic flow calculations

Example Situation: In the pretest briefing, the stack sampling crew leader provided Lois and Clark with a Cyclonic Flow Check Sheet. Using the attached Cyclonic Flow Check Sheet (Exhibit 3.4.2-1, see page 4-57), determine whether the port is acceptable for sampling.

Example Action: To ensure that the sampling site is at a location where the direction of the stack gas flow is known, the team should confirm the absence of cyclonic flow. Lois reviews the cyclonic flow check sheet and checks the rotation angle, α, for all traverse points.

Lois determines that the average value of the rotation angle, α, is less than 20 degrees, which indicates that the overall flow condition in the stack is acceptable.

Cyclonic flow usually exists (1) after certain APCS units, such as cyclones and venturi scrubbers; and (2) in stacks having tangential inlets or other configurations that induce swirling of the gas flow. Cyclonic flow problems can normally be corrected by inserting flow-straightening vanes or baffles in the stack that make stack gas flow parallel to stack walls.

Notes: _____

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EXHIBIT 3.4.2-1
EXAMPLE CYCLONIC FLOW CHECK SHEET

3D PROBE VOLUMETRIC FLOW RATE DATA SHEET

Project Number:	767.	**Bar. Pressure (in. Hg):**	29.20
Client:	XYZ	**Probe Length (ft):**	6.00
Test Location:	U3 Boiler	**% 0_2:**	9.60
Operator:	RPM	**% CO_2:**	10.30
Date:	35240	**Stack Dia. (ft):**	3.33
Start Time:	05:00 PM	**Leak Check:**	OK
Finish Time:	07:00 PM	**Static Pressure (in.H_2o):**	0.50
Test Number:	1	**Stack Area: ST_2**	8.73
		Moisture (%):	12.50%
		Stack Bp (in. Hg):	29.24

Traverse Point	Temperature	Yaw Angle (degree from zero)	P1-Patm	P1-P2	P4-P5	
1	235.00	17	0..12	0.16	0.00	
2	258.40	22	0.13	0.18	0.00	
3	268.80	15	0.11	0.16	0.00	
4	273.20	14	0.12	0.16	0.00	
5	277.20	15	0.13	0.14	0.00	
6	266.80	9	0.14	0.14	0.00	
7	287.60	10	0.15	0.15	0.01	
8	290.40	9	0.16	0.15	0.01	
9	290.80	10	0.15	0.14	0.01	
10	290.90	0	0.15	0.13	0.01	
11	268.00	0	0.22	0.10	0.01	
12	262.00	1	0.14	0.11	0.01	
13	275.60	0	0.09	0.10	0.01	
14	279.90	0	0.13	0.13	0.01	
15	284.40	4	0.10	0.13	0.01	
16	284.60	0	0.11	0.10	0.01	
17	287.80	0	0.15	0.13	0.01	
18	288.20	0	0.12	0.12	0.01	
19	288.20	5	0.15	0.12	0.01	
20	290.60	5	0.13	0.12	0.02	
21	284.00	0	0.17	0.18	0.01	
22	288.20	6	0.07	0.15	0.01	
23	292.00	0	0.17	0.18	0.01	
24	294.80	5	0.17	0.17	0.01	
25	296.40	0	0.17	0.17	0.01	
26	297.40	4	0.17	0.17	0.01	
27	297.80	5	0.17	0.17	0.00	
28	298.00	0	0.17	0.15	0.01	
29	297.80	0	0.15	0.15	0.01	
30	299.20	0	0.13	0.12	0.01	
31	254.00	6	0.08	0.08	0.01	
32	261.00	0	0.07	0.08	0.01	
33	278.40	0	0.07	0.09	0.01	
34	287.60	5	0.08	0.08	0.01	
35	292.20	3	0.10	0.11	0.01	
36	298.40	1	0.11	0.09	0.01	

3D PROBE VOLUMETRIC FLOW RATE DATA SHEET

Project Number:	767.	**Bar. Pressure (in. Hg):**	29.20
Client:	XYZ	**Probe Length (ft):**	6.00
Test Location:	U3 Boiler	**% 0_2:**	9.60
Operator:	RPM	**% CO_2:**	10.30
Date:	35240	**Stack Dia. (ft):**	3.33
Start Time:	05:00 PM	**Leak Check:**	OK
Finish Time:	07:00 PM	**Static Pressure (in.H_2o):**	0.50
Test Number:	1	**Stack Area: ST_2**	8.73
		Moisture (%):	12.50%
		Stack Bp (in. Hg):	29.24

Traverse Point	Temperature	Yaw Angle (degree from zero)	P1-Patm	P1-P2	P4-P5	
37	296.60	2	0.08	0.09	0.02	
38	297.80	4	0.10	0.10	0.02	
39	299.00	0	0.10	0.11	0.03	
40	300.60	10	0.10	0.11	0.03	
Average	283.99	4.6750	0.1280	0.1305	0.0090	

3.4.3 Reviewing Traverse Point Location

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: To ensure that the sample for measuring the pollutant emission rate is representative, the team should collect the sample from each of the equal areas that are obtained by dividing the cross section of the stack into equal areas.

Check For:

- ❑ Traverse point calculation sheet

Example Situation: In the pretest briefing, the stack sampling crew leader provided Lois and Clark with a Preliminary Velocity Traverse Data and Sampling Location Data sheet. Use the attached Preliminary Velocity Traverse Data and Sampling Location Data Sheet (Exhibit 3.4.3-1, see page 4-60) to verify that traverse points are properly located.

Example Action: To ensure that a sample is collected uniformly from the entire cross section of the stack being sampled, the team should verify locations of traverse points. Lois (1) obtains from Clark the sampling site location relative to any flow disturbances, both upstream and downstream, (2) reads Figure 1-1 of Method 1 of Test Methods, Appendix A, 40 CFR Part 60, and (3) determines the following:

For a sampling port located 2.64 stack diameters upstream and 3.28 stack diameters downstream from a flow disturbance, the minimum number of traverse points required for particulate traverse is 24.

Lois understands that the 24 points may be located on two perpendicular diameters, in accordance with Table 1-2 and the example shown in Figure 1-3 of Method 1 of Test Methods, Appendix A, 40 CFR Part 60. Lois verifies the Preliminary Velocity Traverse Data and Sampling Location Data Sheet and concludes that the traverse point locations are acceptable.

Notes: _____

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EXHIBIT 3.4.3-1

EXAMPLE PRELIMINARY VELOCITY TRAVERSE DATA AND SAMPLING LOCATION DATA SHEET

PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

Job Number _____

Job Name _____

Sampling Location _____

Date _____ Time _____

Stack Height 60 ft.

Sampling Port Height Above Ground 30 ft.

	Port A 3C	Port B 5D	Port C	Port D	Average
Port & Inside Diameter (in.)	—	—	101 1/8	100 1/2	100 13/16
Port & Wall Thickness (in.)	1 7/4	6	5	5 15/16	5 1/2
Inside Stack Diameter (in.)	96 1/8	94 9/16	96 1/3	94 9/16	95 3/8

Sampling Ports are 18 ft. 1/2" in. (2.27 stack diameters) downstream from disturbance (inlet, constriction, bend, expansion)

Sampling Ports are 29 ft. 5 in. (3.70 stack diameters) upstream from disturbance (outlet, constriction, bend, expansion)

Point Number	Percent Diameter	Distance from Ref. Point (decimal in.)	Distance from Ref. Point (fractional in.)	Port A ΔP/T_s/α	Port B ΔP/T_s/α	Port C ΔP/T_s/α	Port D ΔP/T_s/α
1	2.1	2.019 / 1.986	2 5/16 / 2	/ /	/ /	0.205 1344 0	0.225 1348 -7
2	6.7	6.440 / 6.336	6 7/16 / 6 5/16	/ /	/ /	0.225 1347 +5	0.240 1351 -5
3	11.8	11.343 / 11.158	11 5/16 / 11 3/16	/ /	/ /	0.160 1346 -9	0.230 1351 0
4	17.7	17.014 / 16.778	17 / 16 3/4	/ /	/ /	0.110 1344 -5	0.210 1351 -2
5	25.0	24.035 / 23.641	24 1/16 / 23 5/8	/ /	/ /	0.070 1344 0	0.165 1351 -3
6	35.6	34.221 / 33.664	34 1/4 / 33 11/16	/ /	/ /	0.065 1340 +19	0.120 1341 +5
7	64.4	61.905 / 60.888	61 7/8 / 60 7/8	/ /	/ /	0.070 1337 +7	0.055 1343 +9
8	75.0	72.094 / 70.972	72 1/8 / 70 15/16	/ /	/ /	0.065 1337 +5	0.060 1342 +12
9	82.3	79.111 / 77.875	79 1/8 / 77 13/16	/ /	/ /	0.060 1330 +10	0.100 1340 +8
10	88.2	84.782 / 83.404	84 13/16 / 83 3/8	/ /	/ /	0.060 1324 +9	0.15 1337 0
11	93.3	89.686 / 88.227	89 11/16 / 88 1/4	/ /	/ /	0.060 1319 0	0.210 1348 +10
12	97.9	94.106 / 92.597	94 1/8 / 92 9/16	/ /	/ /	0.045 1299 0	0.185 1361 0
13				/ /	/ /	/ /	/ /
14				/ /	/ /	/ /	/ /
15				/ /	/ /	/ /	/ /
16				/ /	/ /	/ /	/ /
17				/ /	/ /	/ /	/ /
18				/ /	/ /	/ /	/ /
19				/ /	/ /	/ /	/ /
20				/ /	/ /	/ /	/ /
21				/ /	/ /	/ /	/ /
22				/ /	/ /	/ /	/ /
23				/ /	/ /	/ /	/ /
24				/ /	/ /	/ /	/ /

Pitot Tube No. 10-10-1

C_p = 0.804

P_b = 30.23 "Hg

P_s = -0.20 "H_2O 30.22 "Hg

A_s = 7144 in.²

Average ΔP _____

Average $\Delta P^{1/2}$ _____

Average T_s 337 °F

Average α _____ degrees

3.4.4 Reviewing Sampling Train Assembly

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: Effective stack sampling is pivotal to trial burn success. One of the vital elements of stack sampling is sampling train assembly. The oversight team must ensure that trains are prepared in strict accordance with the SOPs of the test methods and the approved TBP, RBP, or QAPP.

Check For:

- ❑ Availability of clean area for train assembly to prevent any contamination
- ❑ Proper probe markings for traversing within the stack
- ❑ Use of correct amount of reagents in the impingers
- ❑ Storage of sorbent traps at below 20 ˚C
- ❑ Use of proper connectors and sealants
- ❑ Proper assembly of filter in the filter holder

The Method 0010/Total Chromatographicable Organics semivolatile organic compound (SVOC) sampling train consists of a heated particulate filter, condenser, and XAD resin trap. The sampling train is used in SVOC collection. The front half solution, the particulate filter, and XAD resin trap are analyzed for total chromatographic SVOCs (boiling point at 100 °C to 300 °C) and the gravimetric fraction (boiling point greater than 300 °C) in the combined components from the sampling train.

Example Situation: During the assembly of a Method 23—Polychlorinated dibenzopdioxin (PCDD)/polychlorinated dibenzofuran (PCDF) sampling train, prior to beginning the risk burn, Clark watches the operator use acetone-insoluble, heat-stable silicone grease on a glass connector to connect the 100-mL high performance liquid chromatography water impingers. Is this an acceptable procedure?

Example Action: No. Clark refers to the sample transfer lines connection procedure for Method 23 in Test Methods, Appendix A, 40 CFR Part 60 and determines that the method does not recommend the use of sealing greases for sample line connections. He instructs the operator to discontinue the use of sealant grease and to replace the glass connector coated with grease.

Notes: _____

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3.4.5 Observing Leak Checks Prior To Sampling

Regulation: No regulations are applicable to this section of the manual.

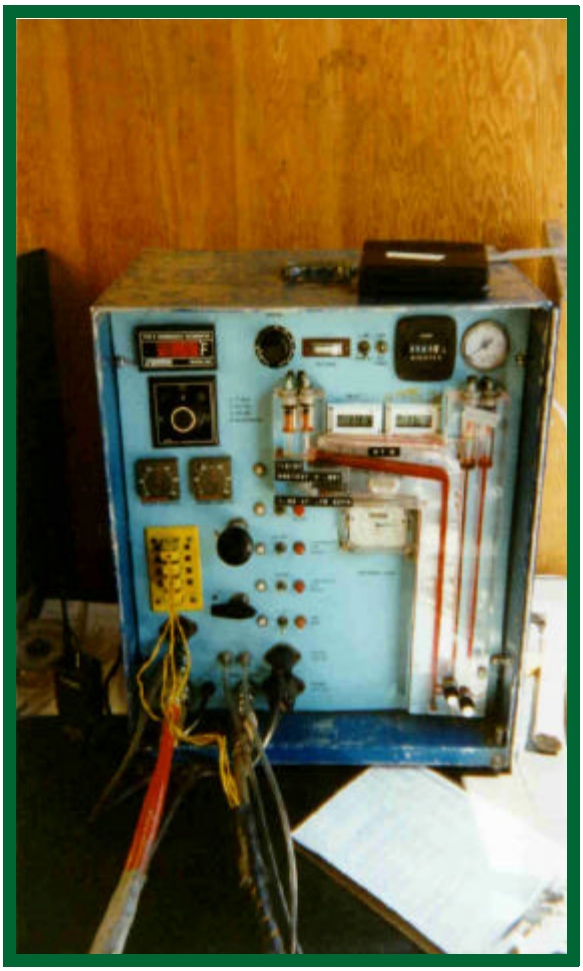
Guidance: No specific references are applicable to this section of the manual.

Explanation: Before a sampling run begins, each sampling train should be checked for leaks to ensure that a sample of stack gases (1) enters the sampling train through the probe nozzle, (2) travels through various components (such as the probe, filter, sorbent trap, impingers, and pump) of the train, and (3) exits the train through the orifice at the end of the dry gas meter.

Check For:

- ❑ Visible breakage of glass components (visual inspection)
- ❑ Leak in pitot tube
- ❑ Leak in fully assembled sampling train

Example Section: Please see the following sampling train photograph and read the comments about the sampling train leak check.



Check for leaks by watching the gas flow meter in the upper right corner of the meter box (black rotating dial) and recording the amount of flow over time.

Example Comments: After the train is assembled, it is leak-checked by plugging the probe nozzle and pulling a 380-millimeter mercury (Hg) (15 inches Hg) vacuum. Observe the dry gas meter dial and record the leakage rate. Leakage rates in excess of 4 percent of the average sampling rate or 0.02 cubic feet per minute are not acceptable, and the stack tester is required to fix the leak in the train before starting a sampling run.

Notes: _____

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3.4.6 Observing Sampling Train Temperatures

Regulation: No regulations are applicable to this section of the manual.

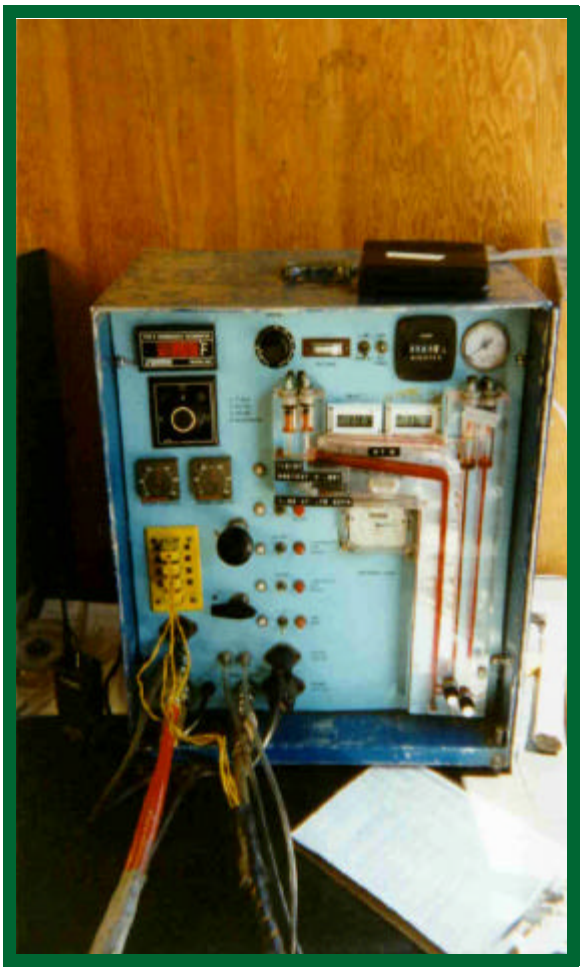
Guidance: No specific references are applicable to this section of the manual.

Explanation: Stack gas test methods require that specific temperatures be maintained at various locations in the sampling train to ensure proper collection or sorption of pollutants onto the collection media. It is, therefore, important to verify proper placement of thermocouples at different locations in the sampling train.

Check For:

- ❑ Thermocouple locations
- ❑ Proper condenser operation
- ❑ Ice in the impinger box

Example Situation: Please see the following sampling train photograph and read the comments about observing sampling train temperatures.



The temperature readout is located in the upper left corner of this meter box. The dial below it changes the readout between various thermocouples attached to the sampling train. If the dial is not labeled, the observer and the sampling train operator should determine corresponding thermal couples for each setting.

Method 23 requires that for efficient capture of PCDDs and PCDFs the XAD-2 sorbent trap temperature never exceed 20° C during testing. During a stack sampling area survey, Lois looks at a Method 23—PCDD/PCDF sampling train and observes that a thermocouple was placed in the middle of the shell side of the condenser before the XAD-2 sorbent trap, and that no thermocouple was placed at the gas entry point on the XAD-2 sorbent trap. Is this procedure correct?

Example Action: No. The thermocouple in the middle of the condenser reads the temperature of recirculating water rather than the temperature of the gas sample that is entering the XAD-2 sorbent trap. Lois instructs the train operator to move the thermocouple to either the tube side of the condenser or to the gas entry position on the XAD-2 sorbent trap.

Notes: _____

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3.4.7 Observing the Field Data Logsheet

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: Stack gas flow and properties vary during trial burn testing, depending on process operating conditions. To calculate average stack gas conditions that represent the state of the stack gas during an entire test run, the sampling train console operator must observe and record instantaneous stack gas conditions at regular intervals during the entire sampling period.

Check For:

- ❑ Number of sampling ports
- ❑ Number of traverse points
- ❑ Field Data Sheet

Example Situation: Observe the elements of the attached Field Data Sheet (Exhibit 3.4.7-1, see page 4-69) and determine the number of traverse points and sampling ports used for stack gas sampling.

Example Comments: The Field Data Sheet shows that stack testing involved sampling from four sampling ports with six traverse points per port. Sampling was conducted for 1 hour in each port. Field data was recorded every 5 minutes for the entire sampling period. Leak checks were conducted once during every port change.

Notes: _____

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EXHIBIT 3.4.7-1

EXAMPLE FIELD DATA SHEET

Run Number 1
Unit #6 Boiler Utility Stack
Date

0010 FIELD DATA
TCO

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H2O (ΔP_s)	Orifice ΔH "H2O Desired	Orifice ΔH "H2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	CO (EMS)	Remarks
C4	1223	551.24	0.32	1.05	1.05	6.0	414	255	254	58	70	70	55	
3	1228	553.96	0.45	1.45	1.45	8.0	414	257	265	58	70	70	55	
3	1233	556.98	0.47	1.55	1.55	8.5	414	254	268	58	71	70	56	
2	1238	560.19	0.62	2.05	2.05	11.0	412	252	249	59	71	71	80	
2	1243	563.87	0.65	2.15	2.15	14.0	413	247	247	62	71	71	56	
1	1248	567.77	0.60	1.95	1.95	13.0	409	249	245	63	72	72	55	
1	1253	571.64	0.69	2.25	2.25	14.5	410	247	255	68	73	73	57	
EMS	1258	575.588	–	–	–	–	–	–	–	–	–	–	LK Check	
D-6	1405	575.700	0.44	1.45	1.45	8.0	418	252	262	64	76	76	64	0.112
6	1411	578.27	0.45	1.45	1.45	9.0	419	258	263	59	76	76	60	
5	1416	581.87	0.54	1.75	1.75	9.5	420	257	262	60	76	76	57	
5	1421	585.47	0.56	1.85	1.85	10.0	420	262	260	65	76	76	53	
4	1426	589.26	0.63	2.10	2.10	10.5	419	263	257	65	76	76	52	
4	1431	592.67	0.63	2.10	2.10	11.0	419	265	264	66	76	76	51	
3	1436	596.58	0.68	2.25	2.25	12.5	419	264	265	66	76	76	51	
3	1441	600.48	0.69	2.25	2.25	13.0	420	265	260	67	77	77	50	
2	1446	604.53	0.67	2.20	2.20	13.0	419	263	264	68	77	77	49	
2	1451	608.27	0.68	2.25	2.25	13.5	419	261	253	67	77	77	49	
1	1456	612.62	0.57	1.85	1.85	13.5	406	259	259	66	78	78	50	
1	1501	617.03	0.52	1.70	1.70	12.0	409	261	262	66	78	78	49	
END	1506	620.260	—	—	—	—	—	—	—	—	—	—	—	LK Check
A-6	1520	620.422	0.17	0.56	0.56	5.0	410	262	263	67	79	79	63	0.162
6	1525	622.47	0.19	0.64	0.64	4.5	413	260	257	68	79	79	62	
5	1530	625.12	0.15	0.50	0.50	4.5	412	262	248	67	79	79	62	
5	1535	626.97	0.14	0.48	0.48	4.0	412	260	262	68	79	79	62	
4	1540	629.02	0.13	0.43	0.43	3.5	409	258	263	67	79	79	61	

EXHIBIT 3.4.7-1 (Continued)

EXAMPLE FIELD DATA SHEET

Run Number 1

Unit: #6 Boiler Stack

Date

0010 FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Temp XAD	Remarks
A-4	1545	630.81	0.12	0.40	0.40	3.0	409	261	258	69	79	79	55	
3	1550	632.31	0.12	0.40	0.40	3.5	409	262	257	67	80	79	56	
3	1555	634.22	0.11	0.36	0.36	3.5	409	259	248	66	79	79	57	
2	1600	636.26	0.09	0.29	0.29	3.0	409	256	249	67	80	80	56	
2	1605	637.82	0.10	0.32	0.32	2.5	409	261	254	68	81	80	55	
1	1610	639.35	0.11	0.37	0.37	3.0	409	260	255	68	81	81	56	
1	1615	641.04	0.12	0.40	0.40	3.0	409	259	254	68	82	81	55	
END	1620	642.758	—	—	—	—	—	—	—	—	—	—		
All	—	—												

		Orsat	
CO	Avg	7.5	7.4/7.8/7.2
O_2		8.6	8.7/8.5/8.6
N_2		83.9	

3.4.8 Observing Leak Checks During Sampling

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: Moving the sampling train between sampling ports is cumbersome, because (1) stack gas sampling trains consist of numerous glass components, and (2) the front half of the train (probe and filter assembly) is usually heated to 120 ± 14°C or 248 ± 25°F. It is important to leak-check the trains whenever they are removed from, or inserted into, a sampling port. Although this check is not required by EPA methods, leak checking between port changes can help ensure that the data will be valid by providing a check on the sampling during the run. Otherwise, the stack tests may not reveal a problem caused by movement during a port change until the run is complete, thereby jeopardizing the viability of the sample.

Check For:

- ❑ Field Data Sheet

Example Situation: During the trial burn test, Lois and Clark were notified that the Method 23 sampling train failed a leak check before the start of sampling in the second sampling port. ABC Environmental reports that the sampling probe was disconnected from the filter holder. The stack sampling crew leader states that it might have happened while the train was being moved from one port to the other and recommend that sampling be continued after the leak is fixed. Lois asks whether a leak check was completed after the train was removed from the first sampling port. She discovers that it was not. Should ABC Environmental be allowed to proceed with the sampling run?

Example Action: No. Because it cannot be established that the leak developed during the port change, the sampling run should be invalidated. To determine when a leak developed in the train, it is important to conduct a leak check immediately after removing the train from a port and again after moving the train to the next port.

Notes: _____

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3.4.9 Observing Sampling Train Disassembly

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: To minimize sample loss or contamination, probe pushers and train movers are expected to handle the train with extreme caution during train operation and while disassembling and moving train components to the sample recovery area.

Check For:

- ❑ Whether the probe nozzle was allowed to touch the stack wall or the platform
- ❑ Whether a final leak check was conducted
- ❑ Whether train components were disassembled without any breakage or loss of sample
- ❑ Whether train components were properly capped, or sealed and labeled, before being transported to the sample recovery area

Example Situation: ABC Environmental reports that the final leak check of the Method 0010-SVOC sampling train failed, and that the leak rate was 0.04 cubic feet per minute. However, the leak check between port changes indicated no leak was present. Charlie of XYZ Company informs Lois and Clark that they would correct the sample volume on the basis of the leak rate and report the results. Is this procedure acceptable?

Example Comments: Yes. In case of a final leak check failure, Method 5 of Test Methods, Appendix A, 40 CFR, Part 60 provides options to either calculate a volume correction on the basis of the leak rate or repeat the sampling run. It is important that the stack sampling team inform the facility contact and permitting agency trial burn observers when a sampling train fails a leak check so that an agreed upon course of action can be taken. Had the leak rate been cause for concern, the facility or agency may have required a repeat of the sampling run. It is much less expensive to repeat a sampling run while already mobilized for a trial burn, then to return to the facility at a later date.

Notes: _____

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3.4.10 Completing Stack Sampling Checklists

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: Observing stack gas sampling activities and documenting these observations as part of the trial burn oversight report are important. Organized observation of sampling procedures can be attained best with the use of checklists for specific procedures being used. Specific items that should be checked for each of the sampling methods followed during a trial burn should be compiled in the form of a checklist for completion during stack sampling. Relevant checklists for observing sample train operation and recovery are included as Attachments A through N.

Check For:

- ❑ Method-specific checklists

Example Section: Attached is a checklist for Method 0010—Semivolatile Sampling Checklist (Exhibit 3.4.10-1, see Page 4-74).

Example Comments: The oversight team should read and understand items identified in the checklist before arriving at the stack testing platform for observation of stack sampling activities.

Notes: _____

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EXHIBIT 3.4.10-1
METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLING CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Did the train components appear to be clean and were all glassware openings covered with Teflon® film, aluminum foil, or noncontaminating caps before the train was assembled?			
Was the train assembled by personnel in a manner that minimized contamination potential?			
Was the train constructed of the components and materials identified in Method 0010 (*See Figure 0010: nozzle, heated probe, particulate filter, one condenser and recirculating cooling water system, one XAD-2 resin trap, four impingers*, control console, etc.)?			
Were the dry gas meter, thermocouples, nozzle, and critical orifice devices calibrated prior to the test? If yes, provide the calibration dates in the Comment column. If available, attach a copy of the calibration records.			Dry gas meter Thermocouples Critical orifice Nozzle
Were weather conditions adverse to sampling (rain, snow, etc.)? If so, describe the measures taken to protect the sampling equipment in the Comment column.			
Was the sampling area (i.e., platform) kept clean and orderly during the run?			
Were the traverse sample points determined in accordance with Method 1?			
Was a cyclonic flow check made before the start of testing? If yes, record the date and time the check was completed in the Comment column.			
Were stack gas oxygen, carbon dioxide, and carbon monoxide concentrations measured by orsat, fyrite, or CEMS?			
Was the manometer leveled and zeroed before the start of sampling? Were periodic checks made by the operator during the test run?			

EXHIBIT 3.4.10-1 (Continued)
METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLING CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the stack static pressure properly measured? At what traverse point was this determined?			
Was the sampling time uniform at each traverse sample point?			
Was the total sampling time at least 120 minutes?			
Were at least 3 dry standard cubic meters of gas sample collected during the run?			
Were the sample train and console adequately monitored by operators and did the operators properly log sampling data on field data sheets during the test run?			

EXHIBIT 3.4.10-1 (Continued)
METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLING CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Were dry gas meter readings recorded at each traverse sample point?			
Was the nozzle sealed with Teflon® film, aluminum foil, or a noncontaminating cap after being removed from the stack at the completion of the run and during leak checks?			
Was particulate matter carefully wiped from the external surfaces of the probe at the completion of the run?			
Was the temperature of the filter box and sample probe maintained at 248 ± 25°F throughout the test run?			
Did protracted or frequent "holds" occur during the sampling run? If so, describe the apparent cause and duration in the Comment column.			
Inspect the field data sheets. Are they clear and completely filled out?			
Were XAD-2 Resin Tubes packed, and spiked by the analytical laboratory with sampling surrogates for semivolatiles?			
Were Field Blanks collected during each run?			
Was the Blank Train set up identically to the actual sampling trains and placed on the stack or at the base of the stack for the duration of one complete sampling run? Was the Blank Train leak checked and heated to temperature throughout the run?			
Were Reagent Blanks collected once during the three runs?			
Were Trip Blanks collected once for each sample shipment?			
Were spiked Resin Blanks prepared and analyzed before the trial burn?			

EXHIBIT 3.4.10-1 (Continued)
METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLING CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

GENERAL OBSERVATIONS AND COMMENTS

3.5 OBSERVING WASTE FEED AND AIR POLLUTION CONTROL DEVICE EFFLUENT SAMPLING

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: To assess the performance of a combustion unit, samplers should collect samples of waste feed and APCS effluent streams with stack gas samples. To ensure collection of a representative sample, samplers should collect samples in strict accordance with SOPs identified in the approved TBP, RBP, and QAPP.

Check For:

- ❑ Whether the liquid in the sampling line was drained before a sample was collected
- ❑ Whether there are any visible air bubbles in the VOA vials
- ❑ Whether samples are collected in accordance with procedures specified in the approved TBP, RBP, and QAPP and at the specified frequency
- ❑ Whether logsheets—showing date, time, run number, and sampler name—are completed for each sample
- ❑ Whether sample containers are labeled—showing date, time, and identification number—with a permanent marker pen
- ❑ Whether sample containers are handled and stored in accordance with procedures specified in the approved TBP, RBP, and QAPP
- ❑ Whether sample traceability and chain-of-custody records are being initiated and maintained for each sample

Waste feed sampling

Example Section: Attached are example *Waste Feed Sample Logsheet* (Exhibit 3.5-1, see page 4-80) and *Chain of Custody Record* (Exhibit 3.5-2, see page 4-81) forms.

Example Comments: To the extent practicable, all sampling activities should be observed a number of times throughout the trial burn testing. Each type of sampling should be observed during the first run, at a minimum, to ensure that sampling techniques are in accordance with the approved TBP and QAPP.

Notes: _____

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EXHIBIT 3.5-1

EXAMPLE WASTE FEED SAMPLE LOGSHEET

[redacted] INTERMEDIATES PLANTS [redacted]

DATA SHEET FOR 1997 RISK TRIAL BURN DATE _____

BOILER NO 6 TEST RUN 1, 2, (3) 4

TIME	WASTE SAMPLE	[redacted]	INITIALS
11:15	✓		MD
11:30	✓		MD
11:45	✓		MD
12:00	✓		MD
12:15	✓		MD
12:30	✓		MD
12:45	✓		MD
13:00	✓		MD
13:15	✓		MD
13:30	✓		MD
13:45	✓		MD
14:00	✓		MD
14:15	✓		MD
14:30	✓		MD
14:45	✓		JP
15:00	✓		JP
15:15	✓		JP
15:30	✓		MD
15:45	✓		MD

EXHIBIT 3.5-2

EXAMPLE CHAIN OF CUSTODY RECORD

Job# ____ Unit Tested Boiler 6 Risk Burn Run 3 CHAIN OF CUSTODY RECORD Page # 1 of 1

Facility Name/Location [redacted]

Collected By/Company [redacted]

SAMPLE I.D.	DATE	TIME	AIR	SOLID	COMP	GRAB	# OF CONTAINERS	RECOVERED BY	HCl	PART.	SO2	SO3	PCDD/PCDF	SEMI-VOC	PCB's	METALS				REMARKS (Specific Compounds/Methods)
Boiler 6 Risk Burn Run 3 Archive 1 of 2, 2 of 2	2/20	1A			X		2													[redacted]
Boiler 6 Risk Burn Run 3 Metals 1 of 2, 2 of 2	2/20	8:55			X		2													All BIF Metals + Selenium & Nickel
Boiler 6 Risk Burn Run 3 Ash, Total Chloride	2/20	8:1			X		1													

Received by:	Date:	Time:	Transported by:	Date:	Time:	Received at Lab by:	Date:	Time:

Analyzed by:	Date:	Time:	Data Reviewed by:	Date:	Time:	Remarks:

Ship to: ____ [redacted]

3.6 OBSERVING PROCESS OPERATION ACTIVITIES

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: The oversight team must periodically observe and document process operating conditions during the trial burn to ascertain whether the BIF unit is being operated in accordance with target operating conditions identified in the approved TBP or RBP. All process operating parameters for which permit limits may be established should be measured during the test.

Check For:

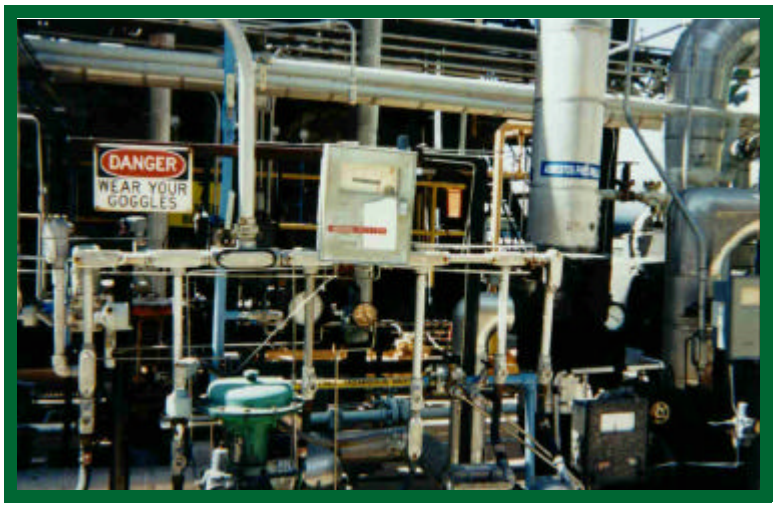
- ❑ Process
  - ❑ Combustion chamber temperature
  - ❑ Combustion gas temperature
  - ❑ Combustion chamber atomization and burner pressure
  - ❑ Combustion gas velocity
  - ❑ Excess air flow rate
  - ❑ Kiln rotational speed
  - ❑ CO concentration
  - ❑ O_2 concentration
  - ❑ Total hydrocarbon concentration
  - ❑ Unit production rates
- ❑ Waste feed
  - ❑ Feed rates
  - ❑ Chlorine input rates
  - ❑ Ash loading rates
  - ❑ Feed spiking compound rates
  - ❑ Atomization fluid pressure
  - ❑ Combustion chamber atomization and burner pressure
- ❑ Residue generation rates
  - ❑ Bottom ash
  - ❑ Fly ash
  - ❑ Scrubber mud and solid residue
- ❑ Cyclone
  - ❑ Pressure drop
  - ❑ Inlet temperature

- ❑ Dry scrubber
  - ❑ Reagent flow rate
  - ❑ Atomizer rotational speed
  - ❑ Atomizer nozzle pressure
  - ❑ Inlet temperature
  - ❑ Outlet temperature
- ❑ Baghouse
  - ❑ Pressure drop
  - ❑ Inlet temperature
- ❑ Electrostatic precipitator
  - ❑ Voltage
  - ❑ Current
  - ❑ Sparking rate
  - ❑ Flue gas flow rate
- ❑ Mist Eliminator
  - ❑ Pressure drop
- ❑ Quencher
  - ❑ Exit temperature
  - ❑ Water flow rate
- ❑ Packed tower scrubber
  - ❑ Pressure drop
  - ❑ Liquid flow rate
  - ❑ Effluent pH
- ❑ Venturi scrubber
  - ❑ Pressure drop
  - ❑ Liquid flow rate
  - ❑ Effluent pH
  - ❑ Gas-to-liquid flow rate ratio
  - ❑ Scrubbing reagent concentration
  - ❑ Scrubbing reagent flow rate
  - ❑ Maximum solids content in effluent

- ❑ Whether the data acquisition recorder (DAR) is a digital or an analog system
- ❑ Whether the digital readout agrees closely with the value on the strip chart recorder

- ❑ Whether process operating conditions are as specified in the approved TBP or RBP

- ❑ Whether there is a way of cross-checking the flow rate on the basis of the volume change in the feed tank; if yes, do flow rates agree closely (± 10 percent)?



Observers should check for consistent readings between the control room DAR and local readouts, as is shown in the center of this photograph.

Example Situation: During a trial burn test run, Lois and Clark observe that the recorder associated with the alcohol waste fuel feed is oscillating more than usual. In addition, the hazardous waste fuel feed rate is recorded by a wide band of ink rather than a fine line as during previous test runs. Should sampling be discontinued?

Example Action: Because the alcohol waste fuel feed rate would be established as a permit condition based on trial burn operating conditions, it is important that the alcohol waste fuel feed rate is monitored and accurately recorded throughout trial burn testing. Lois contacts the trial burn coordinator to discuss the problem. It is discovered that the waste feed rate flow meter is malfunctioning in addition to the recorder pen leaking ink. It is decided that sampling will be discontinued until the flow meter and recorder can be repaired.

Notes: _____

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3.7 OBSERVING SAMPLE RECOVERY

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: Sample recovery operations have the highest potential for contamination or loss of a sample. To ascertain that samples are recovered in accordance with specified methods and reagents identified in the approved TBP or RBP, the oversight team should observe the sample recovery using method-specific sample recovery checklists.

Check For:

- ❑ Reagents used and number of rinses with each reagent
- ❑ Whether samples are recovered in accordance with procedures specified in the approved TBP or RBP
- ❑ Whether liquid levels on sample containers are clearly marked with a permanent marker pen
- ❑ Whether sample labels—showing identification number, date, and time—are affixed firmly to the sample containers
- ❑ Whether a sample identification number logsheet and chain-of-custody records are completed for each sample
- ❑ Whether sample containers are sealed and packaged securely and chilled on ice in ice chests or coolers for transportation

Example Situation: During the trial burn, Clark observes that the Tenax and Tenax/charcoal tubes of Method 0030—Volatile Organics Sampling Train were tightly capped with stainless-steel caps and placed in culture tubes with Teflon®-lined lids. Then, the culture tubes, in addition to an unopened charcoal tube, were put in a zip-lock bag, sealed, and placed in a cooler for transporting to the laboratory. Is this procedure acceptable?

Example Action: No. The charcoal tube in the zip-lock bag should be opened before the bag is sealed for transportation. The charcoal tube is placed in the bag to capture any hydrocarbons that may contaminate the samples. Analysis of the charcoal tube provides an indication of whether contaminant mass is lost during transportation of the sample. This is also known as a trip blank.

The attached Method 0030 - Volatile Organic Sampling Train Recovery Checklist (Exhibit 3.7-1, page 4-86) shows elements of a sample recovery checklist.

Notes: _____

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EXHIBIT 3.7-1

METHOD 0030 VOLATILE ORGANIC SAMPLING TRAIN RECOVERY CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Was the sampling train disassembled at the sampling port location? If so, were the openings of the test train components (adsorbent traps, condensate trap, and so on) sealed before being relocated to the recovery area? Were components sealed with Teflon® tape or noncontaminating caps?			
Was the condensate sample collected for each tube set?			
Was the total condensate sample collected at the conclusion of the test run?			
Were the openings of the adsorbent traps capped after removal from the sampling train and replaced into the original storage vials?			
Was the condensate sample collected into an amber glass VOA vial with a Teflon® septum screw cap?			
Was organic-free water added to the condensate VOA vial to ensure that no air bubbles were present?			
Were at least three tube sets collected during the test run?			
Was a fourth tube set collected during the test run for archiving purposes?			
Was a reagent blank of the organic-free water collected according to the sampling plan? If so, indicate the sample identifier name in the Comment column.			
Was a blank sampling train prepared and recovered at the sampling location? How long did the blank train remain intact before recovery?			
Were the condensate VOA vial and adsorbent tubes properly labeled and stored on ice promptly after recovery?			
Was a trip blank pair of adsorbent tubes included with each sample shipment to the laboratory?			

EXHIBIT 3.7-1 (Continued)

METHOD 0030 VOLATILE ORGANIC SAMPLING TRAIN RECOVERY CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Were *chain-of-custody* and request for analysis forms completed by recovery personnel ?			
Were the appropriate signature(s) affixed to the *chain-of-custody* forms?			

GENERAL OBSERVATIONS AND COMMENTS

3.8 COLLECTING TRIAL BURN TEST INFORMATION

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: It is important to obtain copies of all field data and review them, if possible, before the start of the next run or before leaving the facility. Isokinetic sampling involves uniformly sampling particulates or gases in a stack. Uniform sampling is achieved by maintaining the velocity of the gas stream entering the probe nozzle at a level that is exactly equal to the stack gas velocity. An isokinetic sampling run is valid only if the average sampling rate during the run is ± 10 percent of the isokinetic sampling rate. Before the start of the next run, stack sampling field data sheets should be compiled, and calculations must be verified.

Check For:

- ❑ Whether gas temperatures at different locations in the sampling train during the trial burn test are consistently within the ranges indicated in specific test methods
- ❑ Whether the volumes of stack gas samples collected remained consistently within the ranges indicated in specific test methods
- ❑ Whether isokinetic sampling variations are within ± 10 percent of the isokinetic sampling rate
- ❑ Whether all sampling trains have passed final leak checks
- ❑ Whether process operating conditions maintained during the trial burn test conform with process conditions in the approved TBP or RBP
- ❑ Whether waste feed and APCS effluent samples are collected in conformance with procedures specified in the approved TBP or RBP

Example Situation: Briefly review the attached Field Data Calculation Sheet (Exhibit 3.8-1, see page 4-89), and determine whether the sampling flow rate during the test run was acceptable.

Example Action: Yes. The stack gas sampling rate was about 95.5 percent of the isokinetic sampling rate, which remains in the acceptable isokinetic variation range of 90 to 110 percent.

Notes: _____

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EXHIBIT 3.8-1

EXAMPLE FIELD DATA CALCULATION SHEET

Impinger Box No. M4

			Water Weight Gain		
Impinger 1	Final Weight	769.9		Impinger 1	148.3
	Initial Weight	621.6			
	Increase	148.3		Impinger 2	48.9
Impinger 2	Final Weight	655.2		Impinger 3	10.4
	Initial Weight	606.3			
	Increase	48.9		Impinger 4	7.6
			V_w =		
Impinger 3	Final Weight	536.7	g SO_2 =	Impinger 5	3.6
	Initial Weight	526.3	V_w =		
	Increase	10.4		Impinger 6	15.7
Impinger 4	Final Weight	646.7		Impinger 7	
	Initial Weight	639.1			
	Increase	7.6		Total	234.5 = V_w
Impinger 5	Final Weight	623.5	P_b = 30.14	$\%CO_2$ =	7.5
	Initial Weight	619.9	V_m = 77.127	$\%O_2$ =	8.4
	Increase	3.6	V_w = 234.5	%CO =	0.0
			P_m = 1.230	$\%N_2$ =	84.1
Impinger 6	Final Weight	887.0	Avg ΔP = 0.371	A_s =	7.44
	Initial Weight	871.3		D_n =	0.307
	Increase	15.7	Avg$\sqrt{\Delta P}$ = 0.581	T_s =	120
			C_p = 0.803		
Impinger 7	Final Weight		P_s = −0.35 "H_2O	30.11	"Hg
	Initial Weight		T_m = 80 °F	540	°R
	Increase		T_s = 409 °F	869	°R

Moisture Content: %M = 12.68 M_d = 0.8732 MW_d = 29.536 MW = 28.07

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 77.127 \left[\frac{30.14 + \frac{1.230}{13.6}}{80 + 460}\right] = \frac{76.208\ sft^3}{0.635\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 234.5 = 11.068 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{11.068}{76.208 + 11.068}$ x 100 = 12.68 %

V_s = 5123.8 x 0.581 $\sqrt{\frac{869}{28.07 \times 30.11}}$ x 0.803 = 2424 fpm

ACFM: 120,253

SCFM: 64,444

%I = $\frac{1.039 \times 869 \times 76.208}{0.8732 \times 120 \times 2424 \times 30.11 \times (0.307)^2}$ = 95.5 %

%EA:

3.9 CONDUCTING DAILY MEETINGS

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: Trial burns are both time-intensive and expensive. To (1) assess progress, (2) identify any changes to and deviations from the approved TBP or RBP, and (3) evaluate the impact of changes or deviations on the quality of test data, the oversight team should meet with responsible facility and test personnel at regular intervals and when the oversight team feels that a briefing is necessary to resolve an issue.

Check For: During daily meetings, the oversight team should summarize the following:

- ❑ Trial burn test runs planned for the day
- ❑ Major changes to or deviations from the approved TBP or RBP
- ❑ Problems encountered and their resolution
- ❑ Trial burn progress and completion schedule

Example Situation: During sample recovery of a Method 23A sampling train for PCDDs/PCDFs, Clark observes that front-half and back-half rinses contained three acetone rinses followed by three methylene chloride rinses. Clark recalls that Method 23A requires two toluene rinses to follow the three acetone rinses and three methylene chloride rinses in the sample recovery of front-half and back-half components. Should Clark wait until the end of the day to brief the testing team on the recovery of the Method 23A sampling train?

Example Action: No. Clark informs the stack testing coordinator immediately regarding the deviation to the method and requires that the correct procedure be followed. To the extent practicable, problems and issues should be discussed and resolved immediately in the field through consultations with cognizant regulatory personnel.

Notes: _____

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3.10 CONDUCTING FIELD DOCUMENTATION ACTIVITIES

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: The oversight team should keep comprehensive notes of daily activities throughout the trial burn. Good field documentation helps in preparing a detailed TBO report that would assist the trial burn report reviewer in evaluating the validity and representativeness of the trial burn tests and the permit writer in establishing permit limits based on process operating conditions observed during the test. The oversight team should also obtain photographs of the process unit being tested, waste feed tank, stack sampling platform, and all sampling activities during the trial burn.

Check For: Documentation of field activities should include the following:

- ❑ Process operating parameters for each run
- ❑ General impressions of stack sampling activities
- ❑ General impressions of stack sample recovery activities
- ❑ General impressions of waste feed and APCS sampling activities
- ❑ Deviations from and changes to the approved TBP or RBP

Photodocumentation should include the following:

- ❑ BIF unit being tested
- ❑ Stack showing any obstructions to the flow of stack gases
- ❑ Waste feed storage tanks
- ❑ APCS units
- ❑ Location of stack sampling ports and sampling platform
- ❑ Location of CEMS probe
- ❑ Location of waste feed sampling
- ❑ Location of waste feed spiking
- ❑ Various stack sampling trains used during the trial burn
- ❑ Waste spiking system

- ❑ Waste feed and APCS sampling systems
- ❑ Modifications to or deviations from any standard sampling systems and procedures identified in the approved TBP or RBP

Example Situation: Lois and Clark notice that hazardous waste feed and APCS samples for SVOC analysis were collected in clear glass bottles and were not stored on ice or in ice chests throughout the first trial burn test run sampling period. Lois does not recall whether collection of hazardous waste feed samples in clear glass bottles is an acceptable procedure. Lois photographs the waste feed sampling system.

Lois refers to the approved TBP and QA/QC handbook and determines that samples should have been collected in amber glass bottles and stored on ice in ice chests. Lois requests that the facility follow procedures identified in the approved TBP for the remainder of trial burn test runs. The facility uses amber glass bottles for waste feed sample collection and stores them on ice in ice chests for all remaining test runs. Lois photographs the modified waste feed sampling system.

Example Action: Lois and Clark include photographs of both waste feed sampling systems in the TBO report and recommend that trial burn report reviewer evaluate the impacts of this deviation on data quality of the first trial burn test run.

Notes: _____

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3.11 OBSERVING AUDIT GAS SAMPLING

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: An audit is an assessment of the data by estimating accuracy. Generally, an audit is conducted either to determine the efficacy of a source testing organization's sampling procedures or to quantitatively evaluate the data produced by sample collection, sample recovery, sample analysis, and data processing. CEMS are also audited by introducing known concentrations of gases received from EPA. The results of the performance audit are submitted along with the trial burn results.

Check For:

- ❑ Relative Accuracy Test Audit — Absolute mean difference between gas concentration and the value determined by reference method, plus the 2.5 percent error confidence coefficient of a series of tests divided by the mean of the reference method tests.

- ❑ Cylinder Gas Audit — Challenge the CEMS with an audit gas of known concentration at two points within 20 to 30 percent value and 50 to 60 percent of a known value and assess the accuracy of CEMS by determining the difference between the actual concentration of the audit gas and the concentration indicated by the monitor. These audit gas cylinders are available from most major gas suppliers.

- ❑ Volatile Organic Sampling Train (VOST) — A gas sample containing principal organic hazardous constituents (POHC) is passed from an audit gas cylinder into a glass manifold. A portion of the gas is drawn through a VOST in accordance with method specifications. Collected POHCs are analyzed by the methods identified in the TBP. The analytical results are compared to the known concentrations. The VOST audit gas cylinder is available from Ellen Strieb at U.S. EPA Research Triangle Park (RTP), 919-544-7834. This agency can be contacted only by EPA or state agencies to request a VOST audit gas. It is suggested that 4 weeks lead time be provided for procurement.

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- ❑ PCDDs and PCDFs Audit — A performance audit sample containing tetra through octa-isomers of PCDD and PCDF is analyzed in accordance with the methods identified in the TBP. The analytical results are compared to the known concentrations. These performance audit samples are available from Easter Coptedge at U.S. EPA RTP, 919-541-7863. There have been times in the past when inadequate funding severely delayed or suspended audit sample availability. It is suggested that 4 to 6 weeks lead time be provided to obtain the audit sample.

Example CEMS probe location on a stack. During a cylinder gas audit, the observer should ensure that the audit gas passes through the entire gas conditioning system. This should ideally include as much of the sample line (after the probe) as possible.

Example Situation: During sampling of the VOST audit gas cylinder, Lois observes that (1) audit gases are passed into a heated glass manifold, and (2) a portion of the gases are drawn from the manifold at a rate of 1.0 liter per minute into a pair of sorbent tubes. Lois notices that the condensers positioned before the sorbent tubes do not have water recirculating through them. Is this an acceptable procedure ?

Example Comments: A letter accompanying the audit gas cylinders describes the origin of the cylinder gas, purpose of the audit, and procedures/instructions to be followed for the audit. In reviewing the instructions for sampling POHC from the audit gas cylinder using VOST, Lois realizes that the volume of sample for any pair of sorbent traps should not exceed 10 liters and that the gas stream at the inlet to the first sorbent trap should be maintained at 20°C during sample collection. Lois contacts the trial burn coordinator and requests that the VOST operator circulate chilled water through the condensers and install a thermocouple that indicates the temperature of the gas stream at the inlet to the first sorbent trap.

Notes: _____

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4.0 PREPARING THE OVERSIGHT REPORT

Regulation: No regulations are applicable to this section of the manual.

Guidance: No specific references are applicable to this section of the manual.

Explanation: The trial burn oversight report (1) summarizes sampling and process control operations, (2) identifies any deviations from or changes to methods in the approved TBP, (3) describes problems encountered and their resolution, (4) comments on the representativeness of the trial burn and the data quality, and (5) provides recommendations on permit conditions that should be specified for the facility. The TBO report also documents observations and field notes of the observers and data collected during the trial burn.

Check For: The following is an example outline for a typical TBO report.

- ❑ Overview of the TBO
- ❑ Facility description
  - ❑ Engineering description
  - ❑ Characterization of hazardous waste feed stream
  - ❑ Process operating conditions
  - ❑ CEMS
- ❑ Implementation of the trial burn
  - ❑ Test conditions
  - ❑ Stack sampling
  - ❑ Waste feed sampling
  - ❑ Other sampling activities
  - ❑ Sample analysis
  - ❑ Process monitoring, control, and DAR
  - ❑ Trial burn completion schedule
- ❑ Field Observations
  - ❑ Daily activities of observers
  - ❑ General impressions of observers
  - ❑ Deviations from approved TBP or RBP
  - ❑ Other problems and issues and their resolution
  - ❑ Conclusions and recommendations

Example Situation: Following is an issue that Lois and Clark encountered during a trial burn.

"During the first run of the Utility Boiler, Method 0050 and particle size distribution sampling trains were put on hold for a short period when the feed to the boiler was tripped. The run was completed when waste feed to the boiler restarted at a substantially reduced feed rate."

Example Action: In the TBO report, Lois and Clark recommend that the XYZ Company evaluate how the waste feed cutoff during run one impacts the emission rates of particulate matter, hydrogen chloride, and chlorine gas. They also ask the facility to compare these emission rates with those of the second and third risk burn runs.

Notes: _____

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ATTACHMENT A

METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLING CHECKLIST

(5 Sheets)

METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLING CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Did the train components appear to be clean and were all glassware openings covered with Teflon® film, aluminum foil, or noncontaminating caps before the train was assembled?			
Was the train assembled by personnel in a manner that minimized contamination potential?			
Was the train constructed of the components and materials identified in Method 0010 (*See Figure 0010: nozzle, heated probe, particulate filter, one condenser and recirculating cooling water system, one XAD-2 resin trap, four impingers*, control console, etc.)?			
Were the dry gas meter, thermocouples, nozzle, and critical orifice devices calibrated prior to the test? If yes, provide the calibration dates in the Comment column. If available, attach a copy of the calibration records.			Dry gas meter Thermocouples Critical orifice Nozzle
Were weather conditions adverse to sampling (rain, snow, etc.)? If so, describe the measures taken to protect the sampling equipment in the Comment column.			
Was the sampling area (i.e., platform) kept clean and orderly during the run?			
Were the traverse sample points determined in accordance with Method 1?			
Was a cyclonic flow check made before the start of testing? If yes, record the date and time the check was completed in the Comment column.			
Were stack gas oxygen, carbon dioxide, and carbon monoxide concentrations measured by orsat, fyrite, or CEMS?			
Was the manometer leveled and zeroed before the start of sampling? Were periodic checks made by the operator during the test run?			

METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the probe marked or alternative provisions made to ensure nozzle placements at the traverse point locations determined by Method 1?			
Was the filter inspected before being placed in the filter holder? Was the filter made of quartz or glass fiber?			
Was the filter supported by a glass or Teflon® frit?			
Was a leak check of the sample train performed before and after each port change? *(Note: Allowable leak rate is 0.02 cfm or 4% of the average sampling rate, whichever is less, at 15 inches Hg vacuum or lower if 15 inches is not exceeded during the run.*)			Time / Result Traverse # 1 Before _____ _____ Traverse # 1 After _____ _____ Traverse # 2 Before _____ _____ Traverse # 2 After _____ _____
Were pretest and post test leak checks conducted on the pitot tube?			
Was silicone grease used on any connections upstream of the resin trap?			
Was the nozzle tip positioned at the proper traverse sample point throughout the test run?			
Did operators make timely adjustments to sampling rates to maintain isokinetic conditions throughout the run?			
Was the annulus between the probe and the sampling port sealed during sampling?			
Was the sample gas temperature entering the resin trap maintained and demonstrated to be at or below 68°F throughout the test run?			
Was the sample gas temperature exiting the last impinger maintained at or below 68°F throughout the test run?			

METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the stack static pressure properly measured? At what traverse point was this determined?			
Was the sampling time uniform at each traverse sample point?			
Was the total sampling time at least 120 minutes?			
Were at least 3 dry standard cubic meters of gas sample collected during the run?			
Were the sample train and console adequately monitored by operators and did the operators properly log sampling data on field data sheets during the test run?			
Were dry gas meter readings recorded at each traverse sample point?			
Was the nozzle sealed with Teflon® film, aluminum foil, or a noncontaminating cap after being removed from the stack at the completion of the run and during leak checks?			
Was particulate matter carefully wiped from the external surfaces of the probe at the completion of the run?			
Was the temperature of the filter box and sample probe maintained at 248 ± 25°F throughout the test run?			
Did protracted or frequent "holds" occur during the sampling run? If so, describe the apparent cause and duration in the Comment column.			
Inspect the field data sheets. Are they clear and completely filled out?			
Were XAD-2 Resin Tubes packed, and spiked by the analytical laboratory with sampling surrogates for semivolatiles?			
Were Field Blanks collected during each run?			

METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLING CHECKLIST (CONTINUED)

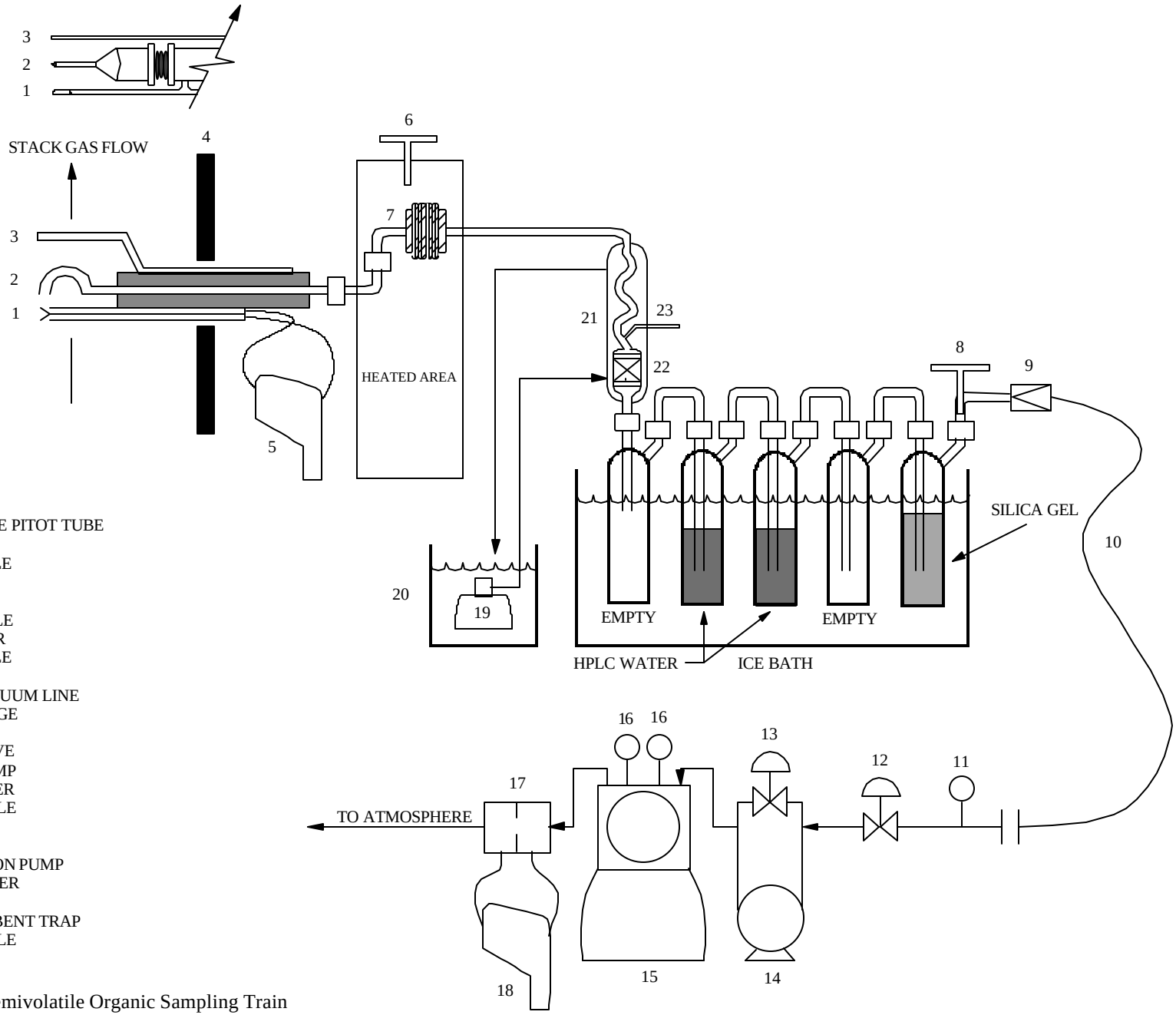
Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the Blank Train set up identically to the acutal sampling trains and placed on the stack or at the base of the stack for the duration of one complete sampling run? Was the Blank Train leak checked and heated to temperature throughout the run?			
Were Reagent Blanks collected once during the three runs?			
Were Trip Blanks collected once for each sample shipment?			
Were spiked Resin Blanks prepared and analyzed before the trial burn?			

GENERAL OBSERVATIONS AND COMMENTS

METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____



1 REVERSE - TYPE PITOT TUBE
2 PROBE
3 THERMOCOUPLE
4 STACK WALL
5 MANOMETER
6 THERMOCOUPLE
7 FILTER HOLDER
8 THERMOCOUPLE
9 CHECK VALVE
10 FLEXIBLE VACUUM LINE
11 VACUUM GAUGE
12 MAIN VALVE
13 BY- PASS VALVE
14 AIR-TIGHT PUMP
15 DRY GAS METER
16 THERMOCOUPLE
17 ORIFICE
18 MANOMETER
19 RECIRCULATION PUMP
20 COOLING WATER
21 CONDENSER
22 XAD-2 ADSORBENT TRAP
23 THERMOCOUPLE

Figure 0010. Semivolatile Organic Sampling Train

ATTACHMENT B

METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLE RECOVERY CHECKLIST

(5 Sheets)

METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the sample train disassembled at the sample port location? If so, were the openings of the test train components (probe, filter bell, resin trap, impinger train, etc.) sealed before being relocated to the recovery area? Were the components sealed with Teflon® tape or noncontaminating caps?			
Was particulate matter visible on the filter? If so, describe the appearance (color, particle size, etc.) in the Comment column.			
Was there any evidence that particulate matter may have bypassed the filter? If so, describe in the Comment column.			
Was the filter recovered with tweezers and loose particulate inside the filter bell collected into the original petri dish? Was the petri dish sealed with Teflon® tape? Was the petri dish made of glass?			
Was the filter recovered intact without loss of particulate?			
Did the "front half" sample train recovery include: an acetone rinse followed by methylene chloride solvent rinses in triplicate while brushing of the nozzle, liner, front half of the filter bell inlet, optional cyclone, and a final rinse of the brush?			
Were all of the "front half" rinses collected in labeled amber glass bottles with Teflon®-lined lids?			
Did the recovery personnel visually inspect the "front half" sample train components after the final rinses?			
Were EPA Level III cleaned and certified bottles used for collecting these "ultra trace level" samples? Were bottle certifications available for inspection?			
Were petri dishes made of glass? Note: Plastic is a source of phthalates and should not be used.			

METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Were glass containers the narrow neck or Boston Round design instead of the wide mouth Packer Bottle design?			
Were the openings of the resin trap sealed with tight fitting noncontaminating plugs or caps? Was the resin trap wrapped with aluminum foil and properly labeled?			
Were the contents of the knockout impingers and deionized water impingers recovered into an amber glass bottle with a Teflon®-lined lid?			
Were the knockout impingers and the deionized water impingers rinsed three times with deionized water followed by methylene chloride?			
Was the moisture gain of each impinger recorded before recovery of the contents was commenced?			
Was the impinger composite and deionized water rinse volume recorded separately than the moisture gain in the impingers?			
Did the "back half" sample train recovery include triplicate acetone followed by methylene chloride rinses of the back half of the filter bell outlet, filter support, coil condenser, and interconnecting glassware?			
Were the contents of the back half sample collected into an amber glass bottle with a Teflon®-lined lid?			
At the conclusion of the sample train recovery, were the openings of the sample train components sealed with Teflon® tape or noncontaminating caps?			
Was the condensate in the impingers collected for this test program in accordance with the approved trial burn plan?			

METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Were reagent blanks of the stock solutions collected? If so, indicate the sample identifiers in the Comment column.			Acetone _____ Methylene chloride _____ Particulate filter _____ Deionized water _____
Was a blank sample train prepared and recovered at the sample location? How long did the blank train remain intact before recovery?			
Was the blank train placed on the stack or at the base of the stack for a period of time equivalent to one run, leak checked before and after the test, and heated to temperature for the duration of one test run?			
At the conclusion of the sample train recovery, were liquid levels in the sample containers marked so that losses due to leakage or evaporation could be detected?			
Were all samples properly labeled and stored on ice promptly after recovery?			
Were the chain of custody and request for analysis forms completed by the recovery personnel?			
Were the appropriate signature(s) affixed to the chain of custody forms?			
Were field blanks of the XAD-2 resin tubes collected during each run?			
Was a trip blank collected for each shipment of MM-5 train samples to the laboratory?			

METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was a tracking system and labeling of samples conducted in such a way as to assist the laboratory in processing as separate samples the following train components: (1) The particulate filter, and the front half of the filter holder, nozzle and probe acetone, methylene chloride solvent rinses (2) The XAD-2 resin tube and the back half of the filter holder, coil condenser, and connecting glassware acetone, methylene chloride solvent rinses (3) Knockout impinger and deionized water impinger composite with deionized water and methylene chloride rinses.			
Was a tracking and labeling system used which was clearly understood by the observer and would this system be clear to the receiving laboratory?			
Was the recovery facility kept clean at all times?			

METHOD 0010 SEMIVOLATILE POHC AND PIC ORGANICS SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

GENERAL OBSERVATIONS AND COMMENTS

ATTACHMENT C

METHOD 0012 MULTIPLE METALS SAMPLING CHECKLIST

(5 Sheets)

METHOD 0012 MULTIPLE METALS SAMPLING CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Did the train components appear to be clean and were all glassware openings covered with Teflon® film before the train was assembled?			
Was the acidic potassium permanganate absorbing solution made fresh on the test day and stored in an amber glass container with a Teflon® lined cap?			
Was the train assembled by personnel in a manner that minimized contamination potential?			
Was the train constructed of the components and materials identified in Method 0012 (See Figure 0012: nozzle, heated probe, filter holder, 4-7 impingers in ice bath, control console, etc.)?			
Was the nozzle and probe liner constructed of glass or quartz?			
Was the dry gas meter, thermocouples, nozzle, and critical orifice devices calibrated prior to the test? If yes, provide the calibration date in the Comment column. If available, attach a copy of the calibration records.			Dry gas meter Thermocouples Critical orifice Nozzle
Were weather conditions adverse to sampling (rain, snow, etc.)? If so, describe the measures taken to protect the sampling equipment in the Comment column.			
Was the sampling area (i.e., platform) kept clean and orderly during the run?			
Were the traverse sample points determined in accordance with Method 1?			
Was a cyclonic flow check made before the start of testing? If yes, record the date and time the check was completed in the Comment column.			

METHOD 0012 MULTIPLE METALS SAMPLING CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Was stack gas oxygen, carbon dioxide, and carbon monoxide concentration measured by orsat, fyrite, or CEMS?			
Was the manometer leveled and zeroed before the start of sampling? Were periodic checks made by the operator during the test run?			
Was the probe marked or alternative provisions made to ensure nozzle placements at the traverse point locations determined by Method 1?			
Was the filter tared and inspected before being placed in the filter holder? Was the filter made of quartz or glass fiber?			
Was the filter supported by a Teflon® frit?			
Was a leak check of the sample train performed before and after each port change? *(Note: Allowable leak rate is 0.02 cfm or 4% of the average sampling rate, whichever is less, at 15 inches Hg vacuum or lower if not exceeded during the run.)*			Time / Result Traverse # 1 Before _____ _____ Traverse # 1 After _____ _____ Traverse # 2 Before _____ _____ Traverse # 2 After _____ _____
Was a pre-test leak check conducted on the pitot tube?			
Was the nozzle tip positioned at the proper traverse sample point throughout the test run?			
Did operators make timely adjustments to sampling rates to maintain isokinetic conditions throughout the run?			

METHOD 0012 MULTIPLE METALS SAMPLING CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Was the annulus between the probe and the sampling port sealed during sampling?			
Was the sample gas temperature exiting the last impinger maintained at or below 68°F throughout the test run?			
Was the stack static pressure properly measured? At what traverse point was this determined?			
Was the sampling time uniform at each traverse sample point?			
Was the total sampling time at least 120 minutes?			
Were the sample train and console adequately monitored by operators and did the operators properly log sampling data on field data sheets during the test run?			
Were dry gas meter readings recorded at each traverse sample point?			
Was the nozzle sealed with Teflon® film after being removed from the stack at the completion of the run?			
Was particulate matter carefully wiped from the external surfaces of the probe at the completion of the run?			
Was the temperature of the filter box and sample probe maintained at 248 ± 25°F throughout the test run?			
Did protracted or frequent “holds” occur during the sampling run? If so, describe the apparent cause and duration in the Comment column.			
Inspect the field data sheets. Are they clear and completely filled out?			

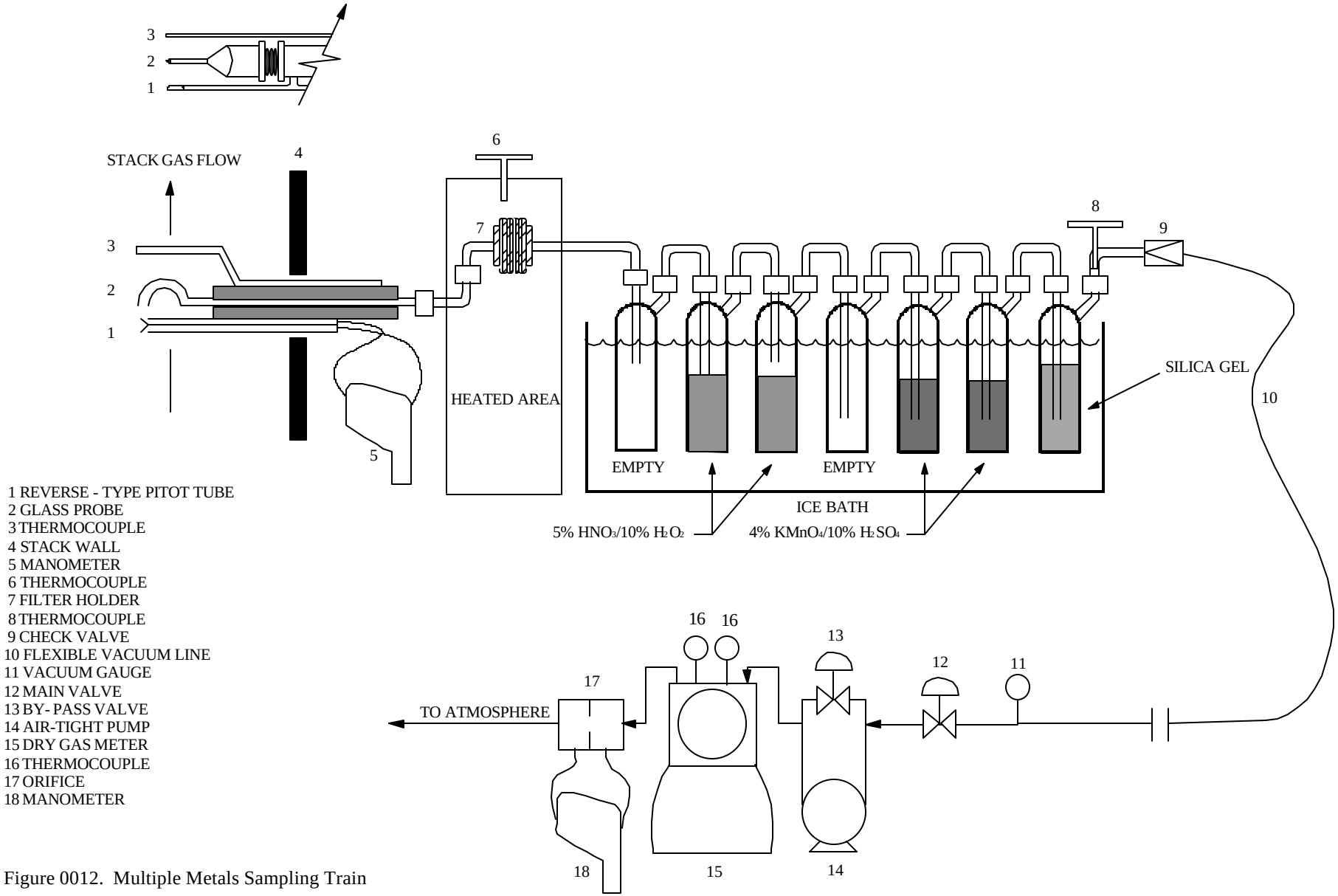
METHOD 0012 MULTIPLE METALS SAMPLING CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

METHOD 0012 MULTIPLE METALS SAMPLING CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

GENERAL OBSERVATIONS AND COMMENTS



1 REVERSE - TYPE PITOT TUBE
2 GLASS PROBE
3 THERMOCOUPLE
4 STACK WALL
5 MANOMETER
6 THERMOCOUPLE
7 FILTER HOLDER
8 THERMOCOUPLE
9 CHECK VALVE
10 FLEXIBLE VACUUM LINE
11 VACUUM GAUGE
12 MAIN VALVE
13 BY- PASS VALVE
14 AIR-TIGHT PUMP
15 DRY GAS METER
16 THERMOCOUPLE
17 ORIFICE
18 MANOMETER

Figure 0012. Multiple Metals Sampling Train

ATTACHMENT D

METHOD 0012 MULTIPLE METALS SAMPLE RECOVERY CHECKLIST

(4 Sheets)

METHOD 12 MULTIPLE METALS SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Was the sample train disassembled at the sample port location? If so, were the openings of the test train components (probe, filter bell, impinger train, etc.) sealed before being relocated to the recovery area? Were the components sealed with Teflon® tape or noncontaminating caps?			
Was particulate matter visible on the filter? If so, describe the appearance (color, particle size, etc.) in the Comment column.			
Was there any evidence that particulate matter may have bypassed the filter? If so, describe in the Comment column.			
Was the filter recovered with tweezers and loose particulate inside the filter bell collected into the original petri dish (Container 1)? Was the petri dish sealed with Teflon® tape?			
Was the filter recovered intact without loss of particulate?			
Was a "front half" recovery of the sample train conducted for particulate matter (Container 2) in the following manner: acetone rinse of the nozzle; brushing and acetone rinse of the liner; brushing and acetone rinse of the filter bell inlet; and, an acetone rinse of the brush?			
Was a Teflon® or nonmetallic brush used for cleaning the inside surfaces of the sample train "front half" components?			
Were all of the particulate matter "front half" acetone rinses collected in a labeled sample container?			

METHOD 12 MULTIPLE METALS SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Was a "front half" recovery of the sample train conducted for metals (Container 3) in the following manner: rinse of nozzle, liner, and filter bell inlet with 100 mL of 0.1 N nitric acid?			
Were all of the metals "front half" rinses collected into the same prelabeled container?			
Was a final nonsample rinse of the "front half" sample train components conducted with deionized water and acetone? Were the openings sealed with Teflon® tape or noncontaminating caps?			
Were the impingers weighed or measured for moisture content determination before recovery of the solution contents?			
Were the liquid contents of impingers 1, 2, and 3 collected in a prelabeled sample bottle (Container 4)?			
Was the filter holder outlet inspected for condensate and, if condensate was present, was it added to Container 4 ?			
Was the filter holder outlet, the filter support, impingers 1-3, and all connecting glassware rinsed with 100 mL of 0.1N nitric acid and added to Container 4?			
Was the liquid contents in impinger 4 collected in an amber glass sample bottle with a Teflon®-lined lid (Container 5a)?			
Was impinger 4 rinsed with 100 mL of 0.1N nitric acid and added to Container 5a?			
Were the liquid contents of impingers 5 and 6 collected in an amber glass bottle with a Teflon®-lined lid (Container 5b)?			

METHOD 12 MULTIPLE METALS SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Were impingers 5 and 6 and connecting glassware triple rinsed with 100 mL of the acidified potassium permanganate solution and the rinsate added to Container 5b?			
Were impingers 5 and 6 and connecting glassware triple rinsed with 100 mL of deionized water and the rinsate added to Container 5b?			
Did the recovery personnel visually inspect impingers 5 and 6 for residue deposits following the deionized water rinse?			
If residue deposits remained in impingers 5 and 6, were they rinsed with 25 mL of 8N hydrogen chloride and collected into an amber glass bottle with a Teflon®-lined cap containing 200 mL deionized water (Container 5c)?			
Was the silica gel impinger weighed to the nearest 0.5g?			
At the conclusion of the sample train recovery, were the openings of the sample train components sealed with Teflon® tape or noncontaminating caps?			
Were reagent blanks of the stock solutions collected according to the sampling plan? If so, indicate the sample identifiers in the Comment column			Acetone_____ Deionized Water_____ 0.1 N HNO_3_____ HNO_3/H_2O_2_____ $H_2SO_4/KMnO_4$_____ 8N HCl_____ Filters (3)_____
Was a blank sample train prepared and recovered at the sample location? How long did the blank train remain intact before recovery?			
Were all samples properly labeled and stored on ice promptly after recovery?			

METHOD 12 MULTIPLE METALS SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Were the chain of custody and request for analysis forms completed by the recovery personnel ?			
Were the appropriate signature(s) affixed to the chain of custody forms?			

GENERAL OBSERVATIONS AND COMMENTS

ATTACHMENT E

METHOD 0013 HEXAVALENT CHROMIUM SAMPLING CHECKLIST

(4 Sheets)

METHOD 0013 HEXAVALENT CHROMIUM SAMPLING CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	Y	N	Comment
Did the train components appear to be clean and were all glassware openings covered with Teflon film before the train was assembled?			
Was the train assembled by personnel in a manner that minimized contamination potential?			
Was the train constructed of the components and materials identified in Method 0013 (*See Figure 0013 - recirculating glass or Teflon probe, Teflon sample line, 5 chilled impingers, etc.*)?			
Was the dry gas meter calibrated prior to the test? If yes, provide the calibration date in the Comment column. If available, attach a copy of the calibration record.			
Were weather conditions adverse to sampling (rain, snow, etc.)? If so, describe the measures taken to protect the sampling equipment in the Comment column.			
Was the sampling area (i.e., platform) kept clean and orderly during the run?			
Were sampling locations determined in accordance with Method 1?			
Was a cyclonic flow check made before the start of testing? If yes, record the date and time the check was completed in the Comment column.			
Were stack gas oxygen, carbon dioxide, and dry molecular weight determined using an Orsat analyzer?			
Was the manometer leveled and zeroed before the start of sampling?			

METHOD 0013 HEXAVALENT CHROMIUM SAMPLING CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	Y	N	Comment
Was the probe marked or alternative provisions made to ensure nozzle placements at the points identified by Method 1?			
Was a pre-test leak check performed?			
Was a leak check performed before and after each port change? *Note: Allowable leak rate is 0.02 cfm or 4% of the average sampling rate, whichever is less, at 15 inches Hg vacuum or lower if not exceeded during the run.*			Time / Result Traverse # 1 Before _____ _____ Traverse # 1 After _____ _____ Traverse # 2 Before _____ _____ Traverse # 2 After _____ _____
Was the probe consistently repositioned at the proper time and to the proper sampling point throughout the run?			
Did operators make timely adjustments to sampling rates to maintain isokinetic conditions throughout the run?			
Was the annulus between the probe and the sampling port sealed during sampling?			
Was the absorbing liquid from the first impinger continuously recirculated through the sample line during the run?			
Was the probe maintained at a temperature below 200 °F throughout sampling to prevent the boiling of the recirculating liquid?			
Was the stack static pressure properly measured?			

METHOD 0013 HEXAVALENT CHROMIUM SAMPLING CHECKLIST

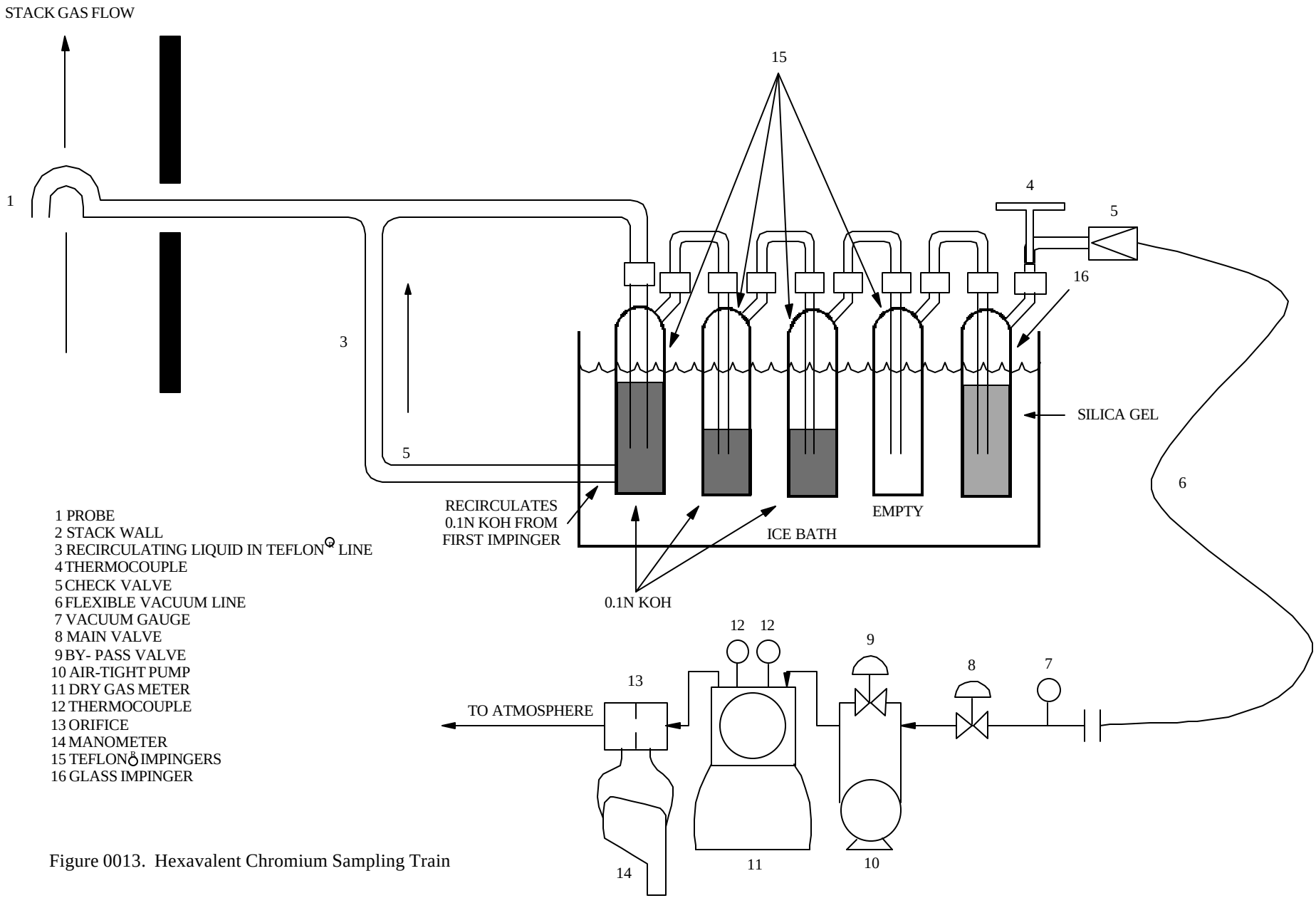
Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	Y	N	Comment
Were pitot tubes leak checked?			
Was the sampling time at each point uniform?			
Was the sampling time at least 120 minutes?			
Were the sampling train and console adequately monitored by operators and did the operators properly log sampling data on field data sheets during sampling?			
Was the nozzle covered with aluminum foil after being removed from the stack at the completion of the run?			
Was particulate matter carefully wiped from the external surfaces of the probe at the completion of the run?			
Was the probe capped at both ends before being removed to the recovery area?			
Did protracted or frequent “holds” occur during the sampling run? If so, describe the apparent cause and duration in the Comment column.			
Inspect the field data sheets. Are they clear and complete and were they reviewed by a senior member of the sampling team following the run?			

METHOD 0013 HEXAVALENT CHROMIUM SAMPLING CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

GENERAL OBSERVATIONS AND COMMENTS



1 PROBE
2 STACK WALL
3 RECIRCULATING LIQUID IN TEFLON® LINE
4 THERMOCOUPLE
5 CHECK VALVE
6 FLEXIBLE VACUUM LINE
7 VACUUM GAUGE
8 MAIN VALVE
9 BY- PASS VALVE
10 AIR-TIGHT PUMP
11 DRY GAS METER
12 THERMOCOUPLE
13 ORIFICE
14 MANOMETER
15 TEFLON® IMPINGERS
16 GLASS IMPINGER

Figure 0013. Hexavalent Chromium Sampling Train

ATTACHMENT F

METHOD 0013 HEXAVALENT CHROMIUM SAMPLE RECOVERY CHECKLIST

(2 Sheets)

METHOD 0013 HEXAVALENT CHROMIUM SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	Y	N	Comment
Was the train disassembled in a clean area in a manner that minimized the potential for sample loss and/or contamination?			
Was the pH of impinger 1 checked and determined to be greater than 8.5?			
Was nitrogen bubbled through the impinger train at approximately 10 liters per minute for 30 minutes?			
Were the liquid contents of impingers 1, 2, 3, and 4 measured or weighed, and recorded on the recovery data sheets?			
Were the liquid contents of impingers 1, 2, 3, and 4 placed in an amber glass sample bottle (Container 1)?			
Were the nozzle, probe, recirculating sample line, and first four impingers rinsed four times with distilled deionized water and were the rinses added to Container 1?			
Were the “back half” of the filter holder, the filter support, and all connecting glassware rinsed with 100 mL of 0.1N nitric acid and were the rinses added to Container 3?			
Were the contents of Container 3 filtered to remove insoluble matter?			
Was Container 3 rinsed 3 times with distilled deionized water and was the rinse solution filtered?			
Were the filter and reservoir rinsed 3 times and were these rinses filtered?			
Was the silica gel impinger weighed to the nearest 0.5g?			

METHOD 0013 HEXAVALENT CHROMIUM SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	Y	N	Comment
Were reagent blanks collected according to the sampling plan?			
Were all samples properly labeled and stored on ice promptly after recovery?			
Were the chain of custody and request for analyses forms completed by recovery personnel ?			
Were the appropriate signature(s) affixed to the chain of custody forms?			

GENERAL OBSERVATIONS AND COMMENTS

ATTACHMENT G

METHOD 23 PCDD/PCDF SAMPLING CHECKLIST

(6 Sheets)

METHOD 23 PCDD/PCDF SAMPLING CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Did the train components appear to be clean and were all glassware openings covered with Teflon® film, aluminum foil, or noncontaminating caps before the train was assembled?			
Was the aluminum foil prerinsed with hexane?			
Was the train assembled by personnel in a manner that minimized contamination potential?			
Was the train constructed of the components and materials identified in Method 23 (*See Figure 23: nozzle, heated probe, particulate filter, one condenser and recirculating cooling water system, XAD-2 resin trap, five impingers, control console, etc.*)?			
Was the dry gas meter, thermocouples, nozzle, and critical orifice devices calibrated prior to the test? If yes, provide the calibration date in the Comment column. If available, attach a copy of the calibration records.			Dry gas meter Thermocouples Critical orifice Nozzle
Were weather conditions adverse to sampling (rain, snow, etc.)? If so, describe the measures taken to protect the sampling equipment in the Comment column.			
Was the sampling area (i.e., platform) kept clean and orderly during the run?			
Were the traverse sample points determined in accordance with Method 1?			
Was a cyclonic flow check made before the start of testing? If yes, record the date and time the check was completed in the Comment column.			

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Was stack gas oxygen, carbon dioxide, and carbon monoxide concentration measured by orsat, fyrite, or CEMS?			
Was the manometer leveled and zeroed before the start of sampling? Were periodic checks made by the operator during the test run?			
Was the probe marked or alternative provisions made to ensure nozzle placements at the traverse point locations determined by Method 1?			
Was the XAD-2 resin prepared within the last four weeks? Indicate the preparation date in the Comment column.			
Was the resin trap covered with aluminum foil and the openings sealed with glass stoppers?			
Was high-performance liquid chromatography grade water used for in the impingers?			
Was the filter tared and inspected before being placed in the filter holder? Was the filter made of glass fiber?			
Was the filter supported with a Teflon® frit or Teflon® -coated wire?			
Was a leak check of the sample train performed before and after each port change? *(Note: Allowable leak rate is 0.02 cfm or 4% of the average sampling rate, whichever is less, at 15 inches Hg vacuum or lower if not exceeded during the run.)*			Time / Result Traverse # 1 Before _____ _____ Traverse # 1 After _____ _____ Traverse # 2 Before _____ _____ Traverse # 2 After _____ _____

METHOD 23 PCDD/PCDF SAMPLING CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Were pre-test and post-test leak checks conducted on the pitot tube?			
Was silicone grease used on any connections of the sample train?			
Was the nozzle tip positioned at the proper traverse sample point throughout the test run?			
Did operators make timely adjustments to sampling rates to maintain isokinetic conditions throughout the run?			
Was the annulus between the probe and the sampling port sealed during sampling?			
Was the sample gas temperature entering the resin trap maintained at or below 68°F throughout the test run?			
Was the sample gas temperature exiting the last impinger maintained at or below 68°F throughout the test run?			
Was the stack static pressure properly measured? At what traverse point was this determined?			
Was the sampling time uniform at each traverse sample point?			
Was the total sampling time at least 120 minutes?			
Were at least 3 dry standard cubic meters of gas sample collected during the run?			

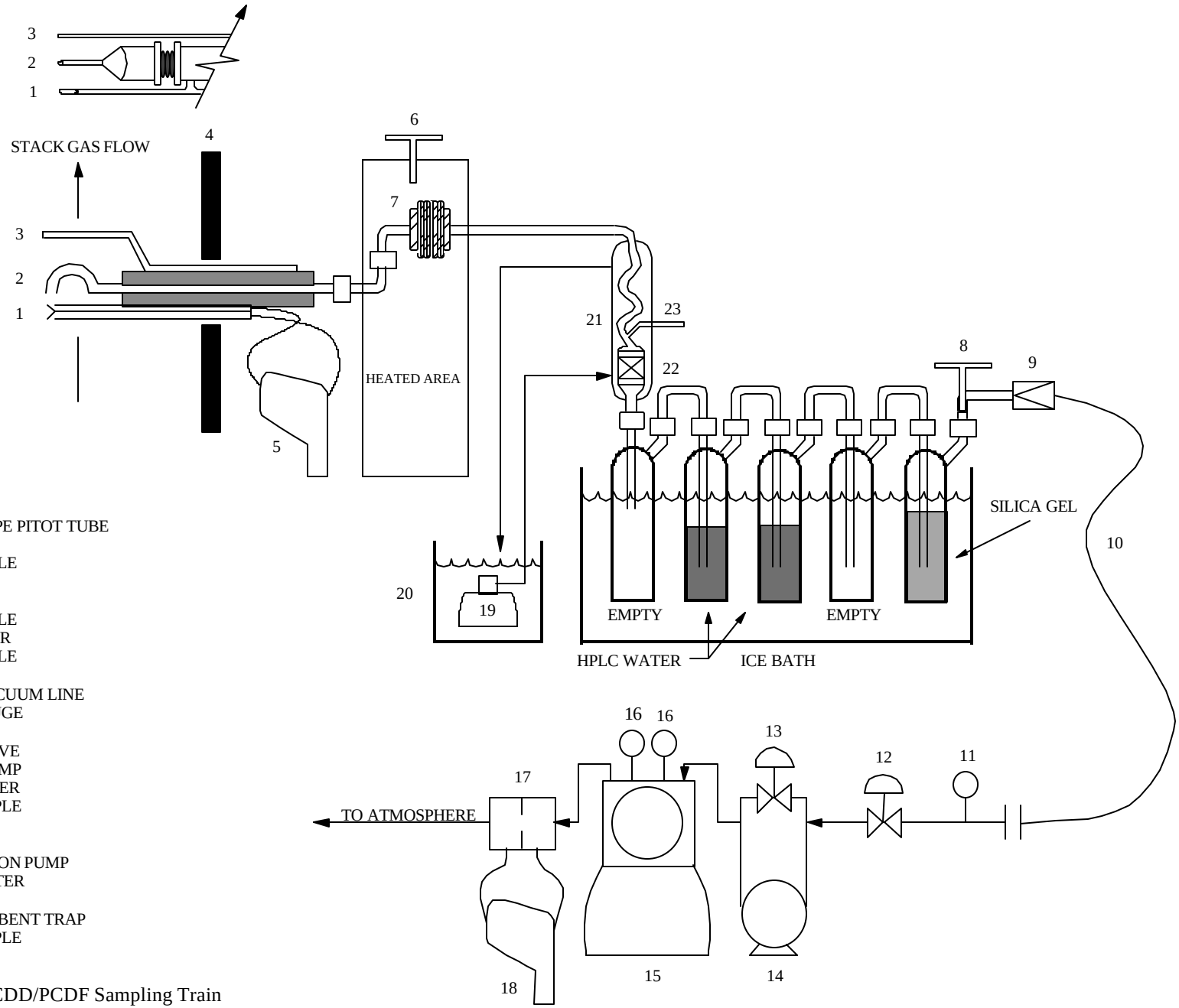
Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Were the sample train and console adequately monitored by operators and did the operators properly log sampling data on field data sheets during the test run?			
Were dry gas meter readings recorded at each traverse sample point?			
Was the nozzle sealed with Teflon® film, aluminum foil, or a noncontaminating cap after being removed from the stack at the completion of the run?			
Was particulate matter carefully wiped from the external surfaces of the probe at the completion of the run?			
Was the temperature of the filter box and sample probe maintained at 248 ± 25°F throughout the test run?			
Did protracted or frequent "holds" occur during the sampling run? If so, describe the apparent cause and duration in the Comment column.			
Inspect the field data sheets. Are they clear and completely filled out?			

METHOD 23 PCDD/PCDF SAMPLING CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

GENERAL OBSERVATIONS AND COMMENTS



1 REVERSE - TYPE PITOT TUBE
2 PROBE
3 THERMOCOUPLE
4 STACK WALL
5 MANOMETER
6 THERMOCOUPLE
7 FILTER HOLDER
8 THERMOCOUPLE
9 CHECK VALVE
10 FLEXIBLE VACUUM LINE
11 VACUUM GAUGE
12 MAIN VALVE
13 BY- PASS VALVE
14 AIR-TIGHT PUMP
15 DRY GAS METER
16 THERMOCOUPLE
17 ORIFICE
18 MANOMETER
19 RECIRCULATION PUMP
20 COOLING WATER
21 CONDENSER
22 XAD-2 ADSORBENT TRAP
23 THERMOCOUPLE

Figure 0023. PCDD/PCDF Sampling Train

ATTACHMENT H

METHOD 23 PCDD/PCDF SAMPLE RECOVERY CHECKLIST

(4 Sheets)

METHOD 23 PCDD/PCDF SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Was the sample train disassembled at the sample port location? If so, were the openings of the test train components (probe, filter bell, resin trap, impinger train, etc.) sealed before being relocated to the recovery area? Were the components sealed with Teflon® tape, hexane rinsed aluminum foil, or noncontaminating caps?			
Was particulate matter visible on the filter? If so, describe the appearance (color, particle size, etc.) in the Comment column.			
Was there any evidence that particulate matter may have bypassed the filter? If so, describe in the Comment column.			
Was the filter recovered with tweezers and loose particulate inside the filter bell collected into the original petri dish (Container 1)? Was the petri dish sealed with Teflon® tape or placed in an amber glass container with a Teflon®-lined cap?			
Was the filter recovered intact without loss of particulate?			
Were the openings of the resin trap sealed with tight fitting noncontaminating plugs or caps? Was the resin trap wrapped with aluminum foil and labeled?			

METHOD 23 PCDD/PCDF SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Did the recovery of the "front half" and "back half" components of the sample train (Container 2) include: 1) A triplicate rinse with acetone and brushing of the nozzle, liner, filter bell inlet, and optional cyclone? 2) A triplicate rinse with methylene chloride of the nozzle, liner, filter bell inlet, and optional cyclone? 3) A triplicate rinse with acetone of the filter bell outlet, condenser coil, and interconnecting glassware? 4) Three separate soakings of the interconnecting glassware and condenser coil with methylene chloride (each soak period at least 5 minutes in duration)?			
Were all of the "front and back half" rinses identified above for Container 2 collected into an amber glass bottle with a Teflon®-lined lid?			
Did a second recovery of the "front half" and "back half" components of the sample train (Container 3) include: 1) A triplicate rinse with toluene of the nozzle, liner, filter bell inlet, and optional cyclone? 2) A triplicate rinse with toluene of the filter bell outlet, condenser coil, and interconnecting glassware?			
Were all of the "front and back half" rinses identified above (second recovery) for Container 3 collected into an amber glass bottle with a Teflon®-lined lid?			
Were the impingers weighed or measured for moisture content determination before discarding the solution contents?			

METHOD 23 PCDD/PCDF SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
At the conclusion of the sample train recovery, were the openings of the sample train components sealed with Teflon® tape, hexane rinsed aluminum foil, or noncontaminating caps?			
Was the condensate in the impingers collected for this test program in accordance with the sampling plan?			
Were high-performance liquid chromatography grade acetone, methylene chloride, and toluene used during the recovery?			
Were reagent blanks of the stock rinsate solutions collected according to the sampling plan? If so, indicate the sample I.D. names in the Comment column			methylene chloride _____ acetone_____ toluene_____
Was a blank sample train prepared and recovered at the sample location? How long did the blank train remain intact before recovery?			
Were all samples properly labeled and stored on ice promptly after recovery?			
Were the chain of custody and request for analysis forms completed by the recovery personnel?			
Were the appropriate signature(s) affixed to the chain of custody forms?			

METHOD 23 PCDD/PCDF SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

GENERAL OBSERVATIONS AND COMMENTS

ATTACHMENT I

METHOD 0030 VOLATILE ORGANICS SAMPLING TRAIN CHECKLIST

(4 Sheets)

METHOD 0030 VOLATILE ORGANICS SAMPLING TRAIN CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Did the train components appear to be clean and were all glassware openings covered with Teflon® film or noncontaminating caps before the train was assembled?			
Was the train assembled by personnel in a manner that minimized contamination potential?			
Were the adsorbent tube cartridges stored on ice before use?			
Was the train constructed of the components and materials identified in Method 0030 (*See Figure 0030: probe, valve, Tenax cartridge, condenser, condensate impinger, condenser, Tenax/charcoal cartridge, silica gel impinger, etc.)?*			
Were the dry gas meter, thermocouples, and rotameter devices calibrated prior to the test? If yes, provide the calibration dates in the Comment column. If available, attach a copy of the calibration records.			Dry gas meter Thermocouples Rotameter
Were weather conditions adverse to sampling (rain, snow, etc.)? If so, describe the measures taken to protect the sampling equipment in the Comment column.			
Was the sampling area (i.e., platform) kept clean and orderly during the run?			
Were pre-test and post-test leak checks of the sample train conducted? *(Note: Pre-test leak check should be <2.5 mm Hg over 1 minute. Post-test leak check should be <2.5 mm Hg over 1 minute at the highest sample train vacuum encountered during the test period*)			

METHOD 0030 VOLATILE ORGANICS SAMPLING TRAIN CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Was the sample rate approximately 1 liter/minute?			
Was ice maintained in the condensing bath throughout the sampling period?			
Was the annulus between the probe and the sampling port sealed during sampling?			
Was the probe temperature maintained above 130°C throughout the test run?			
Was the gas sample temperature entering the Tenax cartridge maintained below 20°C ?			
Were the sample train and console control adequately monitored by the operator and did the operator properly log sampling data on field data sheets during the test run?			
Was the probe tip sealed with Teflon® film or noncontaminating caps after being removed from the stack at the completion of the run?			
Was the total sampling time at least 20 minutes?			
Did protracted or frequent “holds” occur during the sampling run? If so, describe the apparent cause and duration in the Comment column.			
Inspect the field data sheets. Are they clear and completely filled out?			

METHOD 0030 VOLATILE ORGANICS SAMPLING TRAIN CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

GENERAL OBSERVATIONS AND COMMENTS

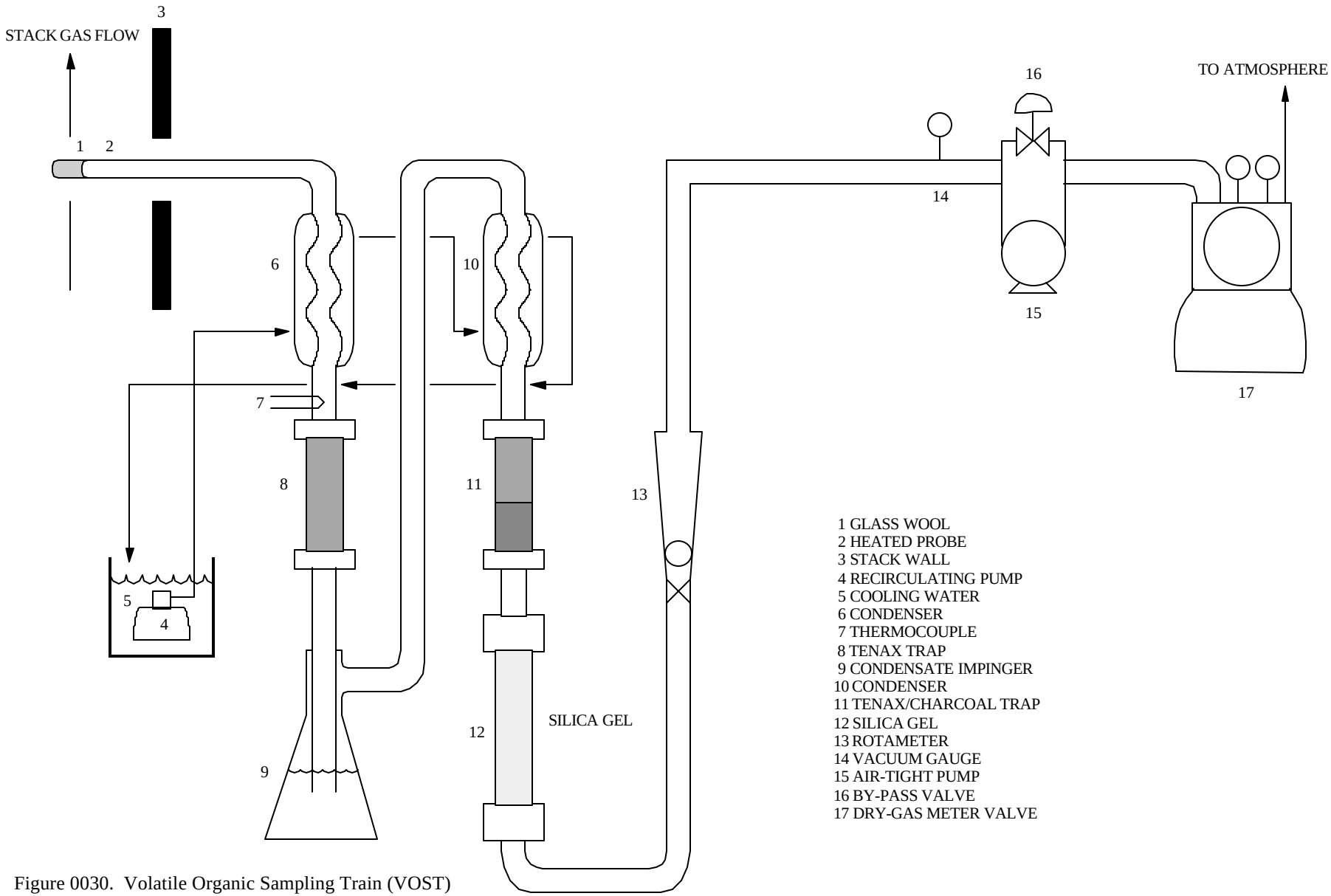


Figure 0030. Volatile Organic Sampling Train (VOST)

ATTACHMENT J

METHOD 0030 VOLATILE ORGANICS SAMPLING TRAIN SAMPLE RECOVERY CHECKLIST

(2 Sheets)

METHOD 0030 VOLATILE ORGANICS SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Was the sample train disassembled at the sample port location? If so, were the openings of the test train components (adsorbent traps, condensate trap, etc.) sealed before being relocated to the recovery area? Were the components sealed with Teflon® tape or noncontaminating caps?			
Was the condensate sample collected for each tube set?			
Was the total condensate sample collected at the conclusion of the test run?			
Were the openings of the adsorbent traps capped after removal from the sample train and replaced into the original storage vials?			
Was the condensate sample collected into an amber glass volatile organic analysis (VOA) vial with a Teflon® septum screw cap?			
Was organic-free water added to the condensate VOA vial to ensure no air bubbles were present?			
Were at least three tube sets collected during the test run?			
Was a fourth tube set collected during the test run for archiving purposes?			
Was a reagent blank of the organic-free water collected according to the approved TBP? If so, indicate the sample identifiers in the Comment column.			
Was a blank sample train prepared and recovered at the sample location? How long did the blank train remain intact before recovery?			
Were the condensate VOA vial and adsorbent tubes properly labeled and stored on ice promptly after recovery?			

METHOD 0030 VOLATILE ORGANICS SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Unit:** _____ **Observer:** _____
Test No. / Description: _____ **Run No.:** _____ **Date:** _____
Run Start Time: _____ **Run Stop Time:** _____

Observation / Requirement	YES	NO	Comment
Was a trip blank pair of adsorbent tubes included with each sample shipment to the laboratory?			
Were the chain of custody and request for analysis forms completed by the recovery personnel ?			
Were the appropriate signature(s) affixed to the chain of custody forms?			

GENERAL OBSERVATIONS AND COMMENTS

ATTACHMENT K

METHOD 0040 TOTAL ORGANICS TEDLAR® BAG SAMPLING CHECKLIST

(5 Sheets)

METHOD 0040 TOTAL ORGANICS TEDLAR® BAG SAMPLING CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Did the train components appear to be clean and were all glassware openings covered with Teflon® film or noncontaminating caps before the train was assembled?			
Was the train assembled by personnel in a manner that minimized contamination potential?			
Was the train constructed of the components and materials identified in Method 0040 (See Figure 0040: probe, filter holder, three-way valves, condenser assembly, knockout impinger, Tedlar® bag, rigid container, control console, etc.)?			
Were the dry gas meter, thermocouples, pitot, and critical orifice devices calibrated prior to the test? If yes, provide the calibration dates in the Comment column. If available, attach a copy of the calibration records.			Dry gas meter_____ Thermocouples Pitot Critical orifice
Were weather conditions adverse to sampling (rain, snow, etc.)? If so, describe the measures taken to protect the sampling equipment in the Comment column.			
Was the sampling area (for example, the platform) kept clean and orderly during the run?			
Were the traverse sample points determined in accordance with Method 1?			
Was a cyclonic flow check made before the start of testing? If yes, record the date and time the check was completed in the Comment column.			
Were stack gas oxygen, carbon dioxide, and carbon monoxide concentration measured by orsat, fyrite, or CEMS?			
Was the Tedlar® bag purged three times with high purity nitrogen before sampling?			

METHOD 0040 TOTAL ORGANICS TEDLAR® BAG SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Were the three-way valve bodies constructed of Teflon® or glass? Were the stopcock valves constructed of Teflon®?			
Was the manometer leveled and zeroed before the start of sampling? Were periodic checks made by the operator during the test run?			
Was the probe marked or alternative provisions made to ensure nozzle placements at the traverse point locations determined by Method 1?			
Was the filter tared and inspected before being placed in the filter holder? Was the filter made of quartz fiber?			
Were pre-test and post-test leak checks of the sample train conducted? *(Note: Allowable leak rate is 0.1 inch Hg over 1 minute or 4% of the sampling rate, whichever is less, at 15 inches Hg vacuum or lower if not exceeded during the run.*)			
Was a pre-test leak check conducted on the pitot tube?			
Was the probe tip positioned at the centroid of the gas stream for proportional sampling criteria? **---OR---** Was the probe tip positioned at the average velocity point for constant rate sampling criteria?			
Were stack gas temperature and velocity head measurements recorded at 5 minute intervals throughout the test run?			
Was ice maintained in the condensing bath throughout the sampling period?			
Was the annulus between the probe and the sampling port sealed during sampling?			

METHOD 0040 TOTAL ORGANICS TEDLAR® BAG SAMPLING CHECKLIST (CONTINUED)

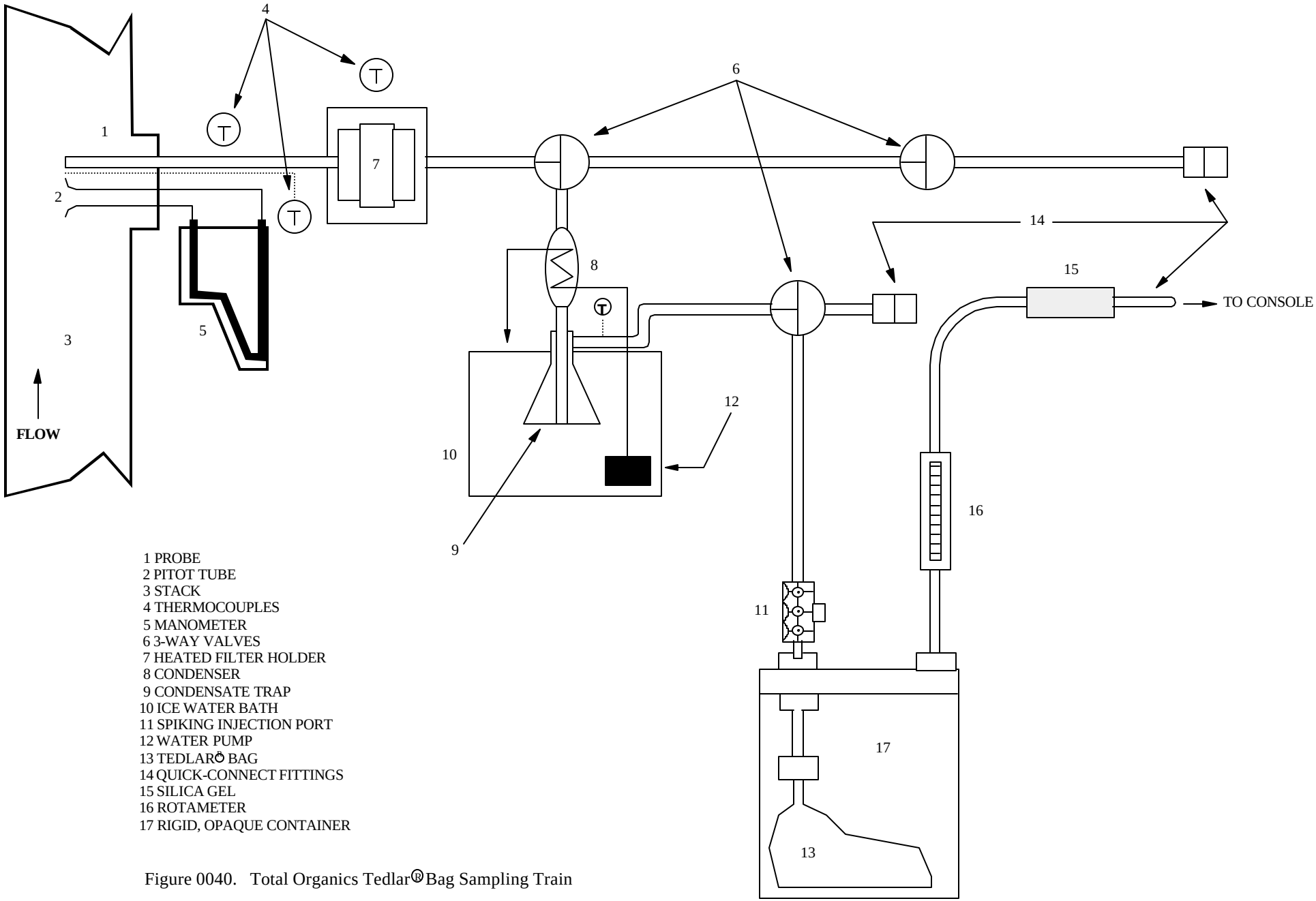
Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the stack static pressure properly measured? At what traverse point was this determined?			
Was the sampling time uniform at each traverse sample point?			
Was the total sampling time at least 60 minutes?			
Were the sample train and console control adequately monitored by operators and did the operators properly log sampling data on field data sheets during the test run?			
Were dry gas meter readings recorded at each traverse sample point?			
Was the condenser temperature maintained between 39.2 and 68°F throughout the run?			
Was the probe, sampling lines, and filter box maintained between 266 and 284°F throughout the run?			
If the stack temperature exceeded 284°F, was the stainless steel sheath on the probe properly cooled?			
Was the probe tip sealed with Teflon® film or noncontaminating caps after being removed from the stack at the completion of the run?			
Did protracted or frequent "holds" occur during the sampling run? If so, describe the apparent cause and duration in the Comment column.			
Inspect the field data sheets. Are they clear and completely filled out?			

METHOD 0040 TOTAL ORGANICS TEDLAR® BAG SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

GENERAL OBSERVATIONS AND COMMENTS



1 PROBE
2 PITOT TUBE
3 STACK
4 THERMOCOUPLES
5 MANOMETER
6 3-WAY VALVES
7 HEATED FILTER HOLDER
8 CONDENSER
9 CONDENSATE TRAP
10 ICE WATER BATH
11 SPIKING INJECTION PORT
12 WATER PUMP
13 TEDLAR® BAG
14 QUICK-CONNECT FITTINGS
15 SILICA GEL
16 ROTAMETER
17 RIGID, OPAQUE CONTAINER

Figure 0040. Total Organics Tedlar® Bag Sampling Train

ATTACHMENT L

METHOD 0040 TOTAL ORGANICS TEDLAR® BAG SAMPLE RECOVERY CHECKLIST

(2 Sheets)

METHOD 0040 TOTAL ORGANICS TEDLAR® BAG SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was at least 15 liters of gas sample collected over the test period?			
Was the Tedlar® bag at least 80% full at the conclusion of the test period?			
Was the sample train disassembled at the sample port location? If so, were the openings of the test train components (condenser, condensate trap, etc.) sealed before being relocated to the recovery area? Were the components sealed with Teflon® tape or noncontaminating caps?			
If present, was condensate in the trap, condenser, and sample line recovered into a measuring cylinder?			
Did the sample train recovery include a triplicate rinse of the condensate trap, condenser, and sample line with high-performance liquid chromatography (HPLC) grade water?			
Were the component rinses collected in the measuring cylinder with the condensate? Was the total volume recorded?			
Were the contents in the measuring cylinder transferred to an amber glass volatile organic analysis (VOA) vial with a Teflon® septum screw cap?			
Was HPLC grade water added to the VOA vial to ensure no air bubbles were present?			
Did the recovery personnel visually inspect the sample train components after the rinses?			
At the conclusion of the sample train recovery, were the openings of the sample train components sealed with Teflon® tape or noncontaminating caps?			
Was a reagent blank of the HPLC grade water collected according to the sampling plan? If so, indicate the sample identifiers in the Comment column.			

METHOD 0040 TOTAL ORGANICS TEDLAR® BAG SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** ____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was a blank sample train prepared and recovered at the sample location? How long did the blank train remain intact before recovery?			
Was the VOA vial properly labeled and stored on ice promptly after recovery?			
Were the chain of custody and request for analysis forms completed by the recovery personnel ?			
Were the appropriate signature(s) affixed to the chain of custody forms?			
Were the Tedlar® bag and VOA vial samples transported to the laboratory immediately after recovery?			
Were the samples analyzed within 72 hours of collection by GC/FID?			

GENERAL OBSERVATIONS AND COMMENTS

METHOD 0040 TOTAL ORGANICS TEDLAR® BAG SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

ATTACHMENT M

METHOD 0050 PARTICULATE/HCl/Cl_2 SAMPLING CHECKLIST

(5 Sheets)

METHOD 0050 PARTICULATE/HCl/Cl_2 SAMPLING CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Did the train components appear to be clean and were all glassware openings covered with Teflon® film or noncontaminating caps before the train was assembled?			
Was the train assembled by personnel in a manner that minimized contamination potential?			
Was the train constructed of the components and materials identified in Method 0050 (See Figure 0050: *nozzle, heated probe, filter holder, 5-6 impingers in ice bath, control console, etc.*)?			
Was the dry gas meter, thermocouples, nozzle, and critical orifice devices calibrated prior to the test? If yes, provide the calibration date in the Comment column. If available, attach a copy of the calibration records.			Dry gas meter_____ Thermocouples Critical orifice Nozzle
Were weather conditions adverse to sampling (rain, snow, etc.)? If so, describe the measures taken to protect the sampling equipment in the Comment column.			
Was the sampling area (i.e., platform) kept clean and orderly during the run?			
Were the traverse sample points determined in accordance with Method 1?			
Was a cyclonic flow check made before the start of testing? If yes, record the date and time the check was completed in the Comment column.			
Was stack gas oxygen, carbon dioxide, and carbon monoxide concentration measured by orsat, fyrite, or CEMS?			
Was the manometer leveled and zeroed before the start of sampling? Were periodic checks made by the operator during the test run?			
Was the probe marked or alternative provisions made to ensure nozzle placements at the traverse point locations determined by Method 1?			

METHOD 0050 PARTICULATE/HCl/Cl_2 SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the filter tared and inspected before being placed in the filter holder? Was the filter made of Teflon®, quartz, or glass fiber?			
Was the filter labeled or marked so as to identify it in the trian or elsewhere whould it be removed?			
Was the filter supported with a Teflon® frit?			
Was the nozzle made of glass?			
Was stopcock grease used to seal ground glass ball joints?			
Was a leak check of the sample train performed before and after each port change? *(Note: Allowable leak rate is 0.02 cfm or 4% of the average sampling rate, whichever is less, at 15 inches Hg vacuum or lower if not exceeded during the run.)*			Time / Result Traverse # 1 Before _____ _____ Traverse # 1 After _____ _____ Traverse # 2 Before _____ _____ Traverse # 2 After _____ _____
Was a pre-test leak check conducted on the pitot tube?			
Was the nozzle tip positioned at the proper traverse sample point throughout the test run?			
Did operators make timely adjustments to sampling rates to maintain isokinetic conditions throughout the run?			
Was the annulus between the probe and the sampling port sealed during sampling?			
Was the sample gas temperature exiting the last impinger maintained at or below 68°F throughout the test run?			

METHOD 0050 PARTICULATE/HCl/Cl_2 SAMPLING CHECKLIST (CONTINUED)

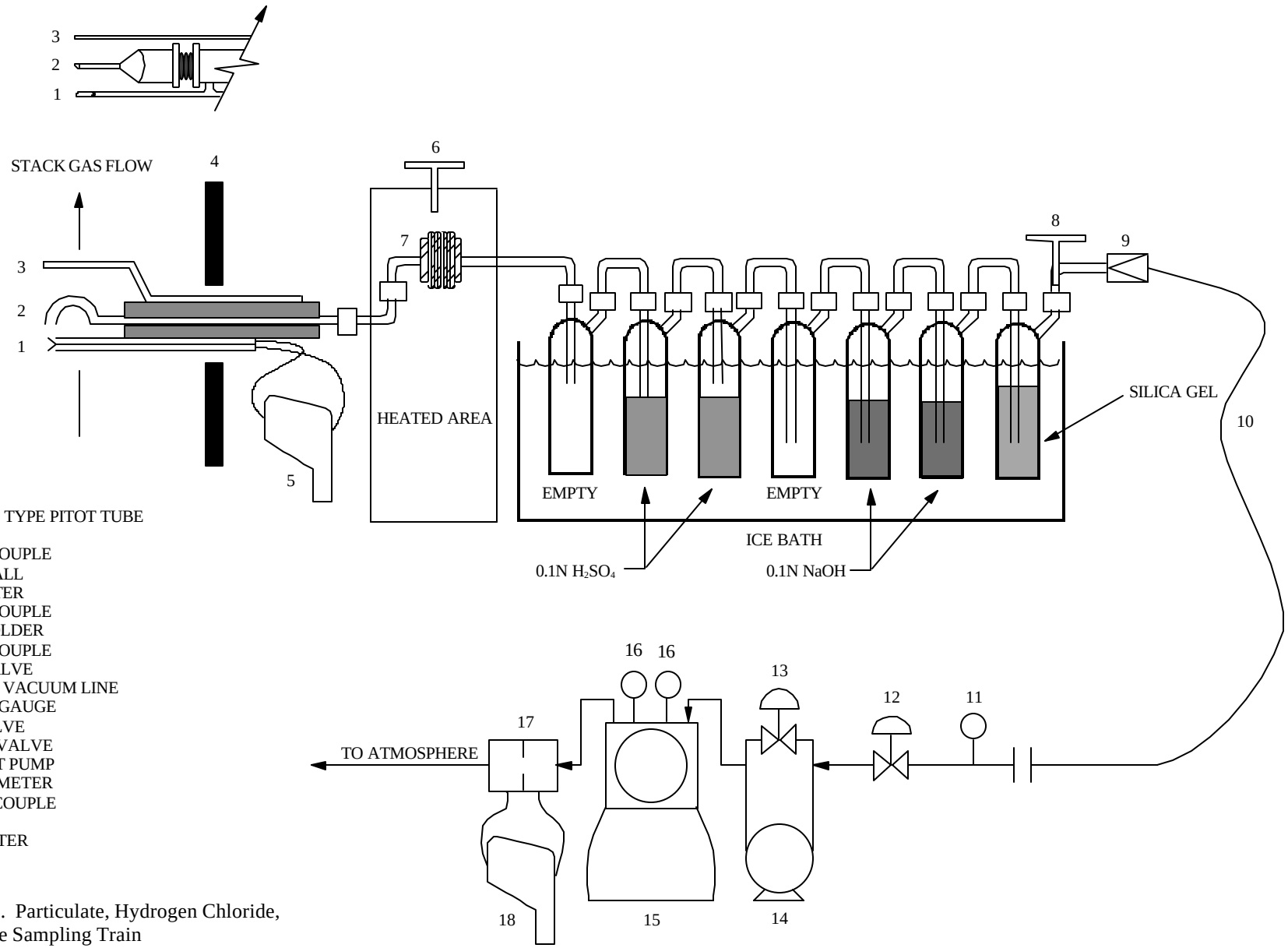
Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the stack static pressure properly measured? At what traverse point was this determined?			
Was the sampling time uniform at each traverse sample point?			
Was the total sampling time at least 120 minutes?			
Were the sample train and console adequately monitored by operators and did the operators properly log sampling data on field data sheets during the test run?			
Were dry gas meter readings recorded at each traverse sample point?			
Was the nozzle sealed with Teflon® film or noncontaminating caps after being removed from the stack at the completion of the run?			
Was particulate matter carefully wiped from the external surfaces of the probe at the completion of the run?			
Was the temperature of the filter box and sample probe maintained at 248 ± 25 °F throughout the test run?			
Did protracted or frequent "holds" occur during the sampling run? If so, describe the apparent cause and duration in the Comment column.			
Inspect the field data sheets. Are they clear and completely filled out?			
Was sampling conducted at a rate of ≤ 0.75 $meters^3$/hour? Higher sampling rates can cause a loss of scrubbing efficiency in the impingers.			

METHOD 0050 PARTICULATE/HCl/Cl_2 SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

GENERAL OBSERVATIONS AND COMMENTS



1 REVERSE - TYPE PITOT TUBE
2 PROBE
3 THERMOCOUPLE
4 STACK WALL
5 MANOMETER
6 THERMOCOUPLE
7 FILTER HOLDER
8 THERMOCOUPLE
9 CHECK VALVE
10 FLEXIBLE VACUUM LINE
11 VACUUM GAUGE
12 MAIN VALVE
13 BY- PASS VALVE
14 AIR-TIGHT PUMP
15 DRY GAS METER
16 THERMOCOUPLE
17 ORIFICE
18 MANOMETER

Figure 0050. Particulate, Hydrogen Chloride, and Chlorine Sampling Train

ATTACHMENT N

METHOD 0050 PARTICULATE/HCl/Cl_2 SAMPLING RECOVERY CHECKLIST

(3 Sheets)

METHOD 0050 PARTICULATE/HCl/Cl_2 SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was condensate present in the sample train "front half" or did the filter appear to be wet? If so, how long was the post test conditioning period conducted on the sample train and at what ΔH rate? Was the ambient air purified through ascarite, sodium hydroxide, activated carbon or some other media?			
Was the sample train disassembled at the sample port location? If so, were the openings of the test train components (probe, filter bell, impinger train, etc.) sealed before being relocated to the recovery area? Were the components sealed with Teflon® tape or noncontaminating caps?			
Was particulate matter visible on the filter? If so, describe the appearance (color, particle size, etc.) in the Comment column.			
Was there any evidence that particulate matter may have bypassed the filter? If so, describe in the Comment column.			
Was the filter recovered with tweezers and loose particulate inside the filter bell collected into the original petri dish? Was the petri dish sealed with Teflon® tape?			
Was the filter recovered intact without loss of particulate?			
Did the "front half" sample train recovery include: an acetone rinse of the nozzle; triplicate brushing and an acetone rinse of the liner; brushing and acetone rinse of the filter bell inlet; and, an acetone rinse of the brush?			
Were all of the "front half" rinses collected in a labeled sample container?			
Did the recovery personnel visually inspect the "front half" sample train components after the rinses?			
Were the impingers weighed or measured for moisture content determination before recovery of the solution contents?			

METHOD 0050 PARTICULATE/HCl/Cl_2 SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Did the hydrogen chloride sample catch include: recovery of the optional knockout condenser; sulfuric acid contents of the next two impingers; and, a deionized water rinse of the filter bell outlet, impingers, and interconnecting glassware?			
Was the hydrogen chloride sample catch collected into a prelabeled amber glass bottle with a Teflon® lined lid?			
Were the sample containers the narrow neck Boston Round type rather than the wide mouth Packer Bottle type? Boston Rounds are for liquid samples, the packer bottles are for solids.			
Did the chlorine sample catch include: sodium hydroxide contents of the next two impingers; and, a deionized water rinse of the impingers and interconnecting glassware?			
Was the chlorine sample catch collected into a prelabeled amber glass bottle with a Teflon® lined lid?			
Was the pH of the 0.1N NaOH impinger catch checked after the test?			
Was the pH of the 0.1N NaOH impinger catch > 8.0? A neutral or acidic pH will not capture Cl_2.			
At the conclusion of the sample train recovery, were the openings of the sample train components sealed with Teflon® tape or noncontaminating caps?			
Were reagent blanks of the stock rinseate solutions collected according to the sampling plan? If so, indicate the sample I.D. names in the Comment column.			Acetone_____ Deionized Water_____ Sulfuric Acid_____ Sodium Hydroxide_____

METHOD 0050 PARTICULATE/HCl/Cl_2 SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** ____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was a blank sample train prepared and recovered at the sample location? How long did the blank train remain intact before recovery?			
Were all samples properly labeled and stored on ice promptly after recovery?			
Were the chain of custody and request for analysis forms completed by the recovery personnel ?			
Was a tracking and labeling system used which was clearly understood by the observer and would this system be clearly understood by the receiving laboratory?			
Were the appropriate signature(s) affixed to the chain of custody forms?			

GENERAL OBSERVATIONS AND COMMENTS

ATTACHMENT O

METHOD 0060 MULTIPLE METALS SAMPLING CHECKLIST

(4 Sheets)

METHOD 0060 MULTIPLE METALS SAMPLING CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Were all of the train's glassware components cleaned before testing by rinsing with hot tap water, and then washed in hot soapy water, rinsed with tap and deionized water? Was this washing followed by soaking in 10 percent HNO_3 for 4 hours, rinsing with deionized water, and final rinsing with acetone?			
Did the train components appear to be clean and were all glassware openings covered with Teflon® film before the train was assembled?			
Was the acidic potassium permanganate absorbing solution made fresh on the test day and stored in an amber glass container with a Teflon® lined cap?			
Was the train assembled by personnel in a manner that minimized contamination potential?			
Was the train constructed of the components and materials identified in Method 0060 (See Figure 0012: nozzle, heated probe, filter holder, 4-7 impingers in ice bath, control console, etc.)?			
Was the nozzle and probe liner constructed of glass or quartz?			
Was the dry gas meter, thermocouples, nozzle, and critical orifice devices calibrated prior to the test? If yes, provide the calibration date in the Comment column. If available, attach a copy of the calibration records.			Dry gas meter Thermocouples Critical orifice Nozzle
Were weather conditions adverse to sampling (rain, snow, etc.)? If so, describe the measures taken to protect the sampling equipment in the Comment column.			
Was the sampling area (for example, the platform) kept clean and orderly during the run?			
Were the traverse sample points determined in accordance with Method 1?			

METHOD 0060 MULTIPLE METALS SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was a cyclonic flow check made before the start of testing? If yes, record the date and time the check was completed in the Comment column.			
Was stack gas oxygen, carbon dioxide, and carbon monoxide concentration measured by orsat, fyrite, or CEMS?			
Was the manometer leveled and zeroed before the start of sampling? Were periodic checks made by the operator during the test run?			
Was the probe marked or alternative provisions made to ensure nozzle placements at the traverse point locations determined by Method 1?			
Was the filter tared and inspected before being placed in the filter holder? Was the filter made of quartz or glass fiber?			
Was the filter supported by a Teflon® frit?			
Was a leak check of the sample train performed before and after each port change? *(Note: Allowable leak rate is 0.02 cfm or 4% of the average sampling rate, whichever is less, at 15 inches Hg vacuum or lower if not exceeded during the run.)*			Time / Result Traverse # 1 Before _____ _____ Traverse # 1 After _____ _____ Traverse # 2 Before _____ _____ Traverse # 2 After _____ _____
Was a pre-test leak check conducted on the pitot tube?			
Was the nozzle tip positioned at the proper traverse sample point throughout the test run?			
Did operators make timely adjustments to sampling rates to maintain isokinetic conditions throughout the run?			
Was the annulus between the probe and the sampling port sealed during sampling?			

METHOD 0060 MULTIPLE METALS SAMPLING CHECKLIST (CONTINUED)

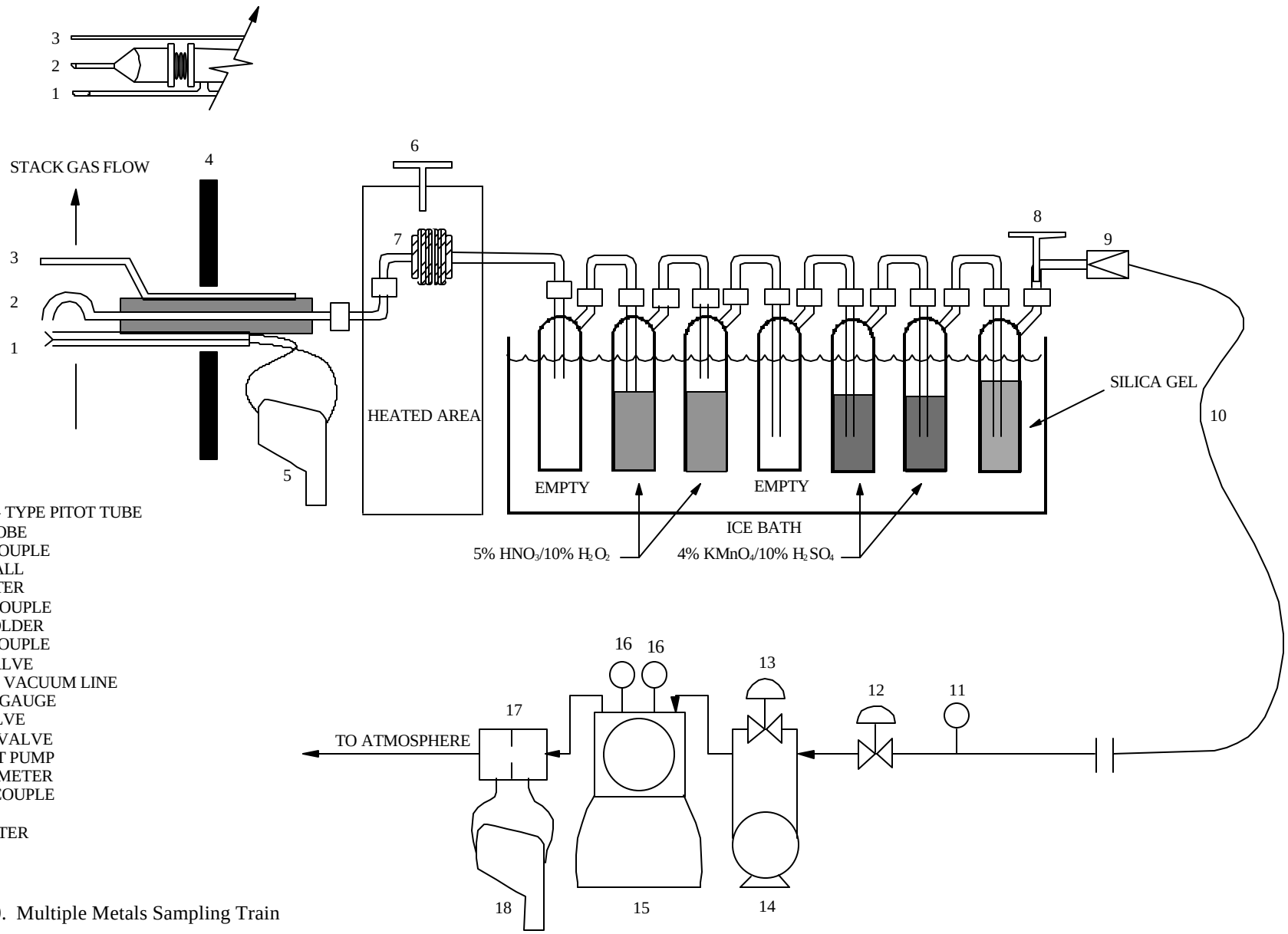
Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the sample gas temperature exiting the last impinger maintained at or below 68°F throughout the test run?			
Was the stack static pressure properly measured? At what traverse point was this determined?			
Was the sampling time uniform at each traverse sample point?			
Was the total sampling time at least 120 minutes?			
Was the sampling rate kept at or below 0.75 m^3 per hour ($\leq$0.75 m^3/hour)?			
Were the sample train and console adequately monitored by operators and did the operators properly log sampling data on field data sheets during the test run?			
Were dry gas meter readings recorded at each traverse sample point?			
Was the nozzle sealed with Teflon® film after being removed from the stack at the completion of the run?			
Was particulate matter carefully wiped from the external surfaces of the probe at the completion of the run?			
Was the temperature of the filter box and sample probe maintained at 248 ± 25°F throughout the test run?			
Did protracted or frequent "holds" occur during the sampling run? If so, describe the apparent cause and duration in the Comment column.			
Inspect the field data sheets. Are they clear and completely filled out?			

METHOD 0060 MULTIPLE METALS SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

GENERAL OBSERVATIONS AND COMMENTS



1 REVERSE - TYPE PITOT TUBE
2 GLASS PROBE
3 THERMOCOUPLE
4 STACK WALL
5 MANOMETER
6 THERMOCOUPLE
7 FILTER HOLDER
8 THERMOCOUPLE
9 CHECK VALVE
10 FLEXIBLE VACUUM LINE
11 VACUUM GAUGE
12 MAIN VALVE
13 BY- PASS VALVE
14 AIR-TIGHT PUMP
15 DRY GAS METER
16 THERMOCOUPLE
17 ORIFICE
18 MANOMETER

Figure 0060. Multiple Metals Sampling Train

ATTACHMENT P

METHOD 0060 MULTIPLE METALS SAMPLE RECOVERY CHECKLIST

(5 Sheets)

METHOD 0060 MULTIPLE METALS SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the sample train disassembled at the sample port location? If so, were the openings of the test train components (probe, filter bell, impinger train, etc.) sealed before being relocated to the recovery area? Were the components sealed with Teflon® tape or noncontaminating caps?			
Was particulate matter visible on the filter? If so, describe the appearance (color, particle size, etc.) in the Comment column.			
Was there any evidence that particulate matter may have bypassed the filter? If so, describe in the Comment column.			
Was the filter recovered with tweezers and loose particulate inside the filter bell collected into the original petri dish? Was the petri dish sealed with Teflon® tape?			
Was the filter recovered intact without loss of particulate?			
NOTE: The acetone rinses are to be eliminated from the sample recovery procedure if stack gas particulate is not being collected on the Method 0060 Sampling Train. Was a "front half" recovery of the sample train conducted for particulate matter in the following manner: acetone rinse of the nozzle; brushing and acetone rinse of the liner; brushing and acetone rinse of the filter bell inlet; and, an acetone rinse of the brush?			
Were glass containers the narrow neck or Boston Round design instead of wide mouth packer bottle design?			
Were EPA Level III cleaned and certified bottles used for collecting these "trace level" samples? Were bottle certifications available for inspection?			

METHOD 0060 MULTIPLE METALS SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was a Teflon® or nonmetallic brush used for cleaning the inside surfaces of the sample train "front half" components?			
Were all of the particulate matter "front half" acetone rinses collected in a labeled sample container?			
Was a "front half" recovery of the sample train conducted for metals in the following manner: rinse of nozzle, liner, and filter bell inlet with 100 mL of 0.1 N nitric acid?			
Were all of the metals "front half" rinses collected into the same prelabeled container?			
Was a final nonsample rinse of the "front half" sample train components conducted with deionized water and acetone? Were the openings sealed with Teflon® tape or noncontaminating caps?			
Were the impingers weighed or measured for moisture content determination before recovery of the solution contents?			
Were the liquid contents of impingers 1, 2, and 3 collected in a prelabeled sample bottle?			
Was the filter holder outlet inspected for condensate and, if condensate was present, was it added to the impinger sample?			
Was the filter holder outlet, the back half of the filter support, impingers 1-3, and all connecting glassware rinsed with 100 mL of 0.1N nitric acid and added to the impinger sample?			
Was the liquid contents in impinger 4 collected in a separate amber glass sample bottle with a Teflon®-lined lid?			
Was impinger 4 rinsed with 100 mL of 0.1N nitric acid and added to the impinger 4 sample?			

METHOD 0060 MULTIPLE METALS SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Did the 4 percent $KmnO_4$/10 percent H_2SO_4 impingers maintain their deep purple color through the sampling and sample recovery process?			
Were the liquid contents of impingers 5 and 6 collected in a separate amber glass bottle with a Teflon®-lined lid?			
Were impingers 5 and 6 and connecting glassware triple rinsed with 100 mL of the acidified potassium permanganate solution and the rinsate added to the impinger 5 and 6 sample?			
Were impingers 5 and 6 and connecting glassware triple rinsed with 100 mL of deionized water and the rinsate added to the impinger 5 and 6 sample?			
Did the recovery personnel visually inspect impingers 5 and 6 for residue deposits or discoloration following the deionized water rinse?			
If residue deposits or discoloration remained in impingers 5 and 6, were they rinsed with 25 mL of 8N hydrogen chloride and collected into a separate amber glass bottle with a Teflon®-lined cap containing 200 mL deionized water?			
Was the silica gel impinger weighed to the nearest 0.5g?			
At the conclusion of the sample train recovery, were the openings of the sample train components sealed with Teflon® tape or noncontaminating caps?			

METHOD 0060 MULTIPLE METALS SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Were reagent blanks of the stock solutions collected according to the sampling plan? If so, indicate the sample identifiers in the Comment column.			Acetone_____ Deionized water_____ 0.1N HNO_3_____ 5%HNO_3/10%H_2O_2_____ 4%$KMnO_4$/10%H_2SO_4_____ 8N HCl_____ Particulate Filters (3)_____
Was a blank sample train prepared and recovered at the sample location? How long did the blank train remain intact before recovery?			
Was the blank train placed on the stack or at the base of the stack for a period of time equivalent to one run, leak checked before and after the test, and heated to temperature for the duration of one test run?			
Were all samples properly labeled and stored on ice promptly after recovery?			
Were the chain of custody and request for analysis forms completed by the recovery personnel ?			
Was a tracking and labeling system used which was clearly understood by the observer and would this system be clearly understood by the receiving laboratory?			
Were the appropriate signature(s) affixed to the chain of custody forms?			

METHOD 0060 MULTIPLE METALS SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

GENERAL OBSERVATIONS AND COMMENTS

ATTACHMENT Q

METHOD 0061 HEXAVALENT CHROMIUM SAMPLING CHECKLIST

(3 Sheets)

METHOD 0061 HEXAVALENT CHROMIUM SAMPLING CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	Y	N	Comment
Did the train components appear to be clean and were all glassware openings covered with Teflon film before the train was assembled?			
Was the train assembled by personnel in a manner that minimized contamination potential?			
Was the train constructed of the components and materials identified in Method 0061 (*See Figure 0061: recirculating glass or Teflon probe, Teflon sample line, 5 chilled Teflon impingers, etc.*)? Note: The method prescribes a 0.1N KOH impinger solution for trapping Cr^{+6}. Experience has demonstrated that 0.1N is not sufficiently concentrated to maintain a pH > 8.5 in the first impinger. The run will be ruled invalid if the pH in the 1st impinger drops below 8.5, therefore, it is recommended that at least a 1.0N KOH solution be used in the entire train.			
Was the dry gas meter calibrated prior to the test? If yes, provide the calibration date in the Comment column. If available, attach a copy of the calibration record.			
Were weather conditions adverse to sampling (rain, snow, etc.)? If so, describe the measures taken to protect the sampling equipment in the Comment column.			
Was the sampling area (for example, the platform) kept clean and orderly during the run?			
Were sampling locations determined in accordance with Method 1?			
Was a cyclonic flow check made before the start of testing? If yes, record the date and time the check was completed in the Comment column.			
Were stack gas oxygen, carbon dioxide, and dry molecular weight determined using an Orsat analyzer?			
Was the manometer leveled and zeroed before the start of sampling?			

METHOD 0061 HEXAVALENT CHROMIUM SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

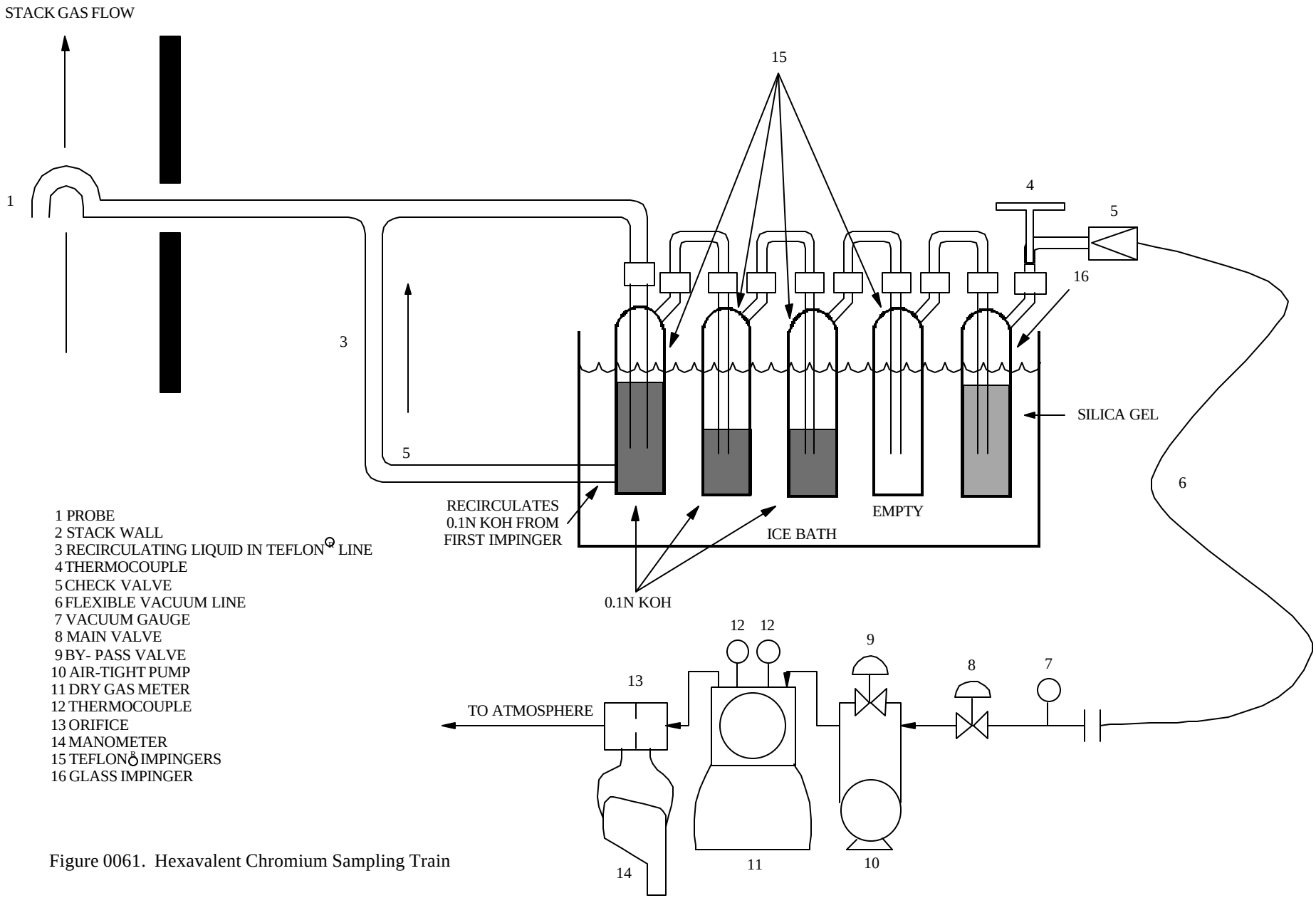
Observation / Requirement	Y	N	Comment
Was the probe marked or alternative provisions made to ensure nozzle placements at the points identified by Method 1?			
Was a pre-test leak check performed?			
Was a leak check performed before and after each port change? *Note: Allowable leak rate is 0.02 cfm or 4% of the average sampling rate, whichever is less, at 15 inches Hg vacuum or lower if not exceeded during the run.*			Time / Result Traverse # 1 Before _____ _____ Traverse # 1 After _____ _____ Traverse # 2 Before _____ _____ Traverse # 2 After _____ _____
Was the probe consistently repositioned at the proper time and to the proper sampling point throughout the run?			
Did operators make timely adjustments to sampling rates to maintain isokinetic conditions throughout the run?			
Was the annulus between the probe and the sampling port sealed during sampling?			
Was the absorbing liquid from the first impinger continuously recirculated through the sample line during the run?			
Was the probe maintained at a temperature below 200 °F throughout sampling to prevent the boiling of the recirculating liquid?			
Was the stack static pressure properly measured?			
Were pitot tubes leak checked?			
Was the sampling time at each point uniform?			
Was the sampling time at least 120 minutes?			

METHOD 0061 HEXAVALENT CHROMIUM SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	Y	N	Comment
Were the sampling train and console adequately monitored by operators and did the operators properly log sampling data on field data sheets during sampling?			
Was the nozzle covered with aluminum foil after being removed from the stack at the completion of the run?			
Was particulate matter carefully wiped from the external surfaces of the probe at the completion of the run?			
Was the probe capped at both ends before being removed to the recovery area?			
Did protracted or frequent "holds" occur during the sampling run? If so, describe the apparent cause and duration in the Comment column.			
Inspect the field data sheets. Are they clear and complete and were they reviewed by a senior member of the sampling team following the run?			

GENERAL OBSERVATIONS AND COMMENTS



1 PROBE
2 STACK WALL
3 RECIRCULATING LIQUID IN TEFLON® LINE
4 THERMOCOUPLE
5 CHECK VALVE
6 FLEXIBLE VACUUM LINE
7 VACUUM GAUGE
8 MAIN VALVE
9 BY- PASS VALVE
10 AIR-TIGHT PUMP
11 DRY GAS METER
12 THERMOCOUPLE
13 ORIFICE
14 MANOMETER
15 TEFLON® IMPINGERS
16 GLASS IMPINGER

Figure 0061. Hexavalent Chromium Sampling Train

ATTACHMENT R

METHOD 0061 HEXAVALENT CHROMIUM SAMPLE RECOVERY CHECKLIST

(3 Sheets)

METHOD 0061 HEXAVALENT CHROMIUM SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	Y	N	Comment
Was the train disassembled in a clean area in a manner that minimized the potential for sample loss and/or contamination?			
Was the pH of impinger 1 checked and determined to be greater than 8.5? Did the pH of the first impinger drop below 8.5 during the run?			
Was nitrogen bubbled through the impinger train at approximately 10 liters per minute for 30 minutes?			
Were the liquid contents of impingers 1, 2, 3, and 4 measured or weighed, and recorded on the recovery data sheets?			
Were the liquid contents of impingers 1, 2, 3, and 4 placed in a polyethylene sample container?			
Were the nozzle, probe, recirculating sample line, and first four impingers rinsed four times with distilled deionized water and were the rinses added to the impinger sample?			
Note: The 0.1N HNO_3 back half rinse can be eliminated whenever Total Chomium is not being determined on this sampling train. Were the "back half" of the filter holder, the filter support, and all connecting glassware rinsed with 100 mL of 0.1N nitric acid and were the rinses added to a separate polyethylene container?			
Were the contents of the 0.1N KOH impinger composite filtered through a 0.45µ acetate filter to remove insoluble matter?			
Was the sample container rinsed 3 times with distilled deionized water and was the rinse solution filtered with the sample?			
Were the filter and reservoir rinsed 3 times and were these rinses added to the sample being filtered?			

METHOD 0061 HEXAVALENT CHROMIUM SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	Y	N	Comment
Was the silica gel impinger weighed to the nearest 0.5g?			
Were reagent blanks of 0.1N KOH impinger solution and deionized water collected according to the sampling plan?			
Were arrangements made with a laboratory that set up analysis of these samples within the 24 hour holding time required in SW-846 Method 7199? If the 24 hour holding time is not being used, is field spiking of the final sample being conducted immediately after filtering is complete?			
If field spiking is being conducted, were three portions of the original sample set up so that one portion could be submitted to the analytical laboratory unspiked, and the other portions spiked at 10 ppb and 25 ppb (or other appropriate spike level)? All spiked samples are to be analyzed by the laboratory.			
Were all samples properly labeled and stored on ice promptly after recovery?			
Were the chain of custody and request for analyses forms completed by recovery personnel ?			
Were the appropriate signature(s) affixed to the chain of custody forms?			

METHOD 0061 HEXAVALENT CHROMIUM SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

GENERAL OBSERVATIONS AND COMMENTS

ATTACHMENT S

METHOD 0031 VOLATILE ORGANICS SAMPLING TRAIN CHECKLIST

(3 Sheets)

METHOD 0031 VOLATILE ORGANICS SAMPLING TRAIN CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Note: The VOST is being used to characterize the stack gas for Products of Incomplete Combustion (PICs). Some PICs have very low boiling points which requires that the sampling rate be ≤ 0.5 liters/minute and that the gas sample entering the first Tenax resin tube be ≤ 10°C. Otherwise losses of analyte will occur. This is a three tube configuration.			
Are all adsorbent tubes prepared for use on this trial burn prepared from new resin material, and specifically not been used at other sites?			
Did the train components appear to be clean and were all glassware openings covered with Teflon® film or noncontaminating caps before the train was assembled?			
Was the train assembled by personnel in a manner that minimized contamination potential?			
Were all adsorbance tubes prepared within 2 weeks of the test?			
Were the adsorbent tube cartridges stored on ice before use?			
Are all adsorbent tubes prepared for use on this trial burn prepared from new resin material, and specifically not been used at other sites?			
Was the train constructed of the components and materials identified in Method 0031 (*See Figure 0031: probe, valve, Tenax cartridges, condenser, condensate impinger, condenser, Anasorb® cartridge, silica gel impinger, etc.)?*			
Were the dry gas meter, thermocouples, and rotameter devices calibrated prior to the test? If yes, provide the calibration dates in the Comment column. If available, attach a copy of the calibration records.			Dry gas meter_____ Thermocouples Rotameter
Were weather conditions adverse to sampling (rain, snow, etc.)? If so, describe the measures taken to protect the sampling equipment in the Comment column.			

METHOD 0031 VOLATILE ORGANICS SAMPLING TRAIN CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the sampling area (i.e., platform) kept clean and orderly during the run?			
Were pre-test and post-test leak checks of the sample train conducted? *(Note: Pre-test leak check should be <2.5 mm Hg over 1 minute. Post-test leak check should be <2.5 mm Hg over 1 minute at the highest sample train vacuum encountered during the test period*)			
Was the sample rate approximately 0.5 liter/minute?			
Was ice maintained in the condensing bath throughout the sampling period?			
Was the gas temperature entering the first Tenax resin tube maintained at $\leq 10^{o}$C during sampling?			
Was the annulus between the probe and the sampling port sealed during sampling?			
Was the probe temperature maintained above 130°C throughout the test run?			
Were the sample train and console control adequately monitored by the operator and did the operator properly log sampling data on field data sheets during the test run?			
Was the probe tip sealed with Teflon® film or noncontaminating caps after being removed from the stack at the completion of the run?			
Was the total sampling time at least 40 minutes per VOST tube set?			
Did protracted or frequent "holds" occur during the sampling run? If so, describe the apparent cause and duration in the Comment column.			
Inspect the field data sheets. Are they clear and completely filled out?			

METHOD 0031 VOLATILE ORGANICS SAMPLING TRAIN CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

GENERAL OBSERVATIONS AND COMMENTS

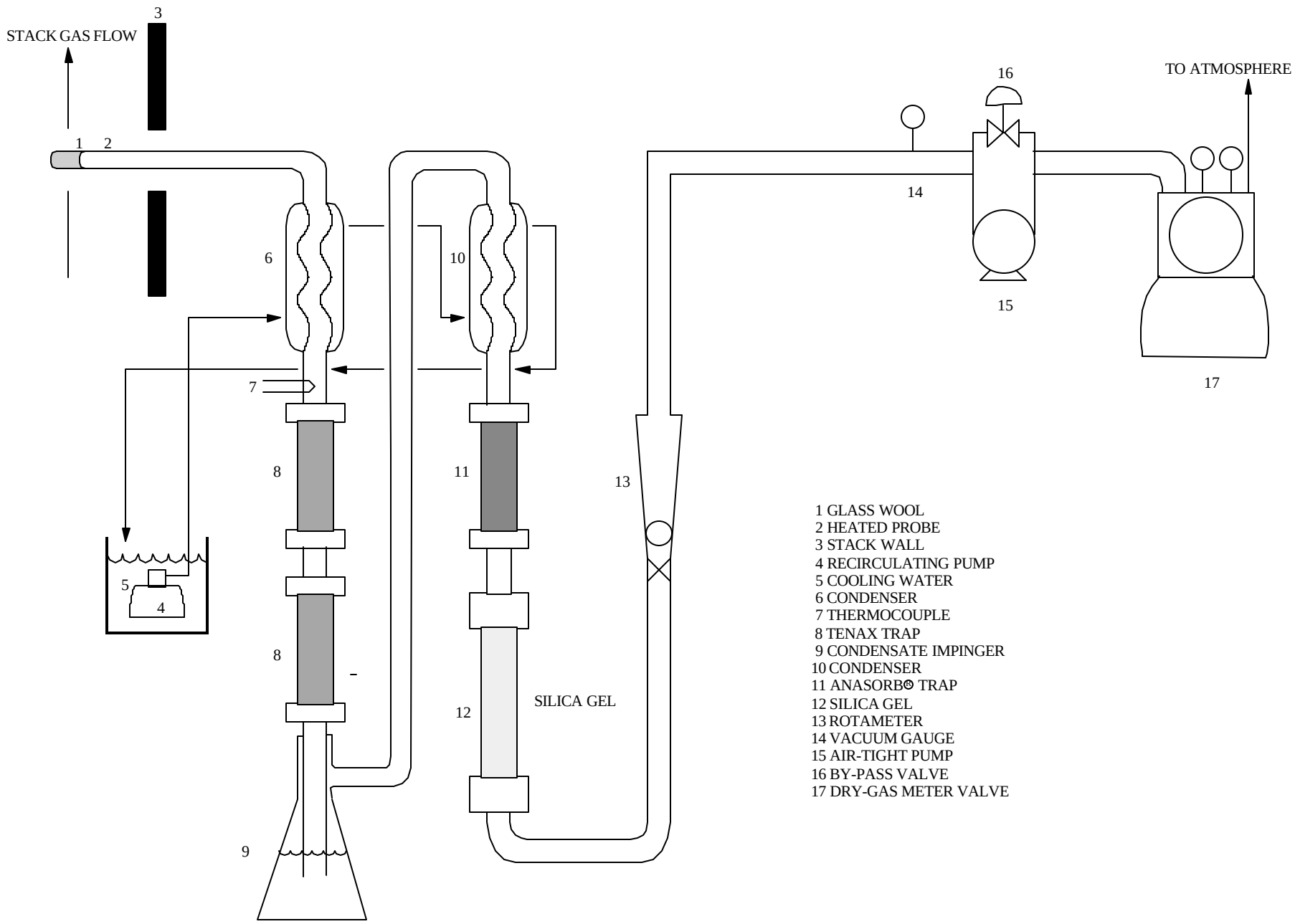


Figure 0031. Volatile Organics Sampling Train (VOST)

ATTACHMENT T

METHOD 0031 VOLATILE ORGANICS RECOVERY CHECKLIST

(2 Sheets)

METHOD 0031 VOLATILE ORGANICS SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the total condensate sample collected at the conclusion of the test run? Was the volume of the condensate measured and recorded at the end of the run?			
Were the openings of the adsorbent traps capped after removal from the sample train and replaced into the original storage vials?			
Was the condensate sample collected into an amber glass volatile organic analysis (VOA) vial with a Teflon® septum screw cap?			
If the volume of the condensate was less than 40 mLs, was organic-free water added to the condensate VOA vial to ensure no air bubbles were present? If the volume of the condensate is > 40 mLs, only one VOA should be filled with no air bubbles, and the remainder discarded.			
Were at least three tube sets collected during the test run?			
Was a fourth tube set collected during the test run for archiving purposes?			
Was a reagent blank of the organic-free water collected according to the approved TBP? If so, indicate the sample identifiers in the Comment column.			
Were the condensate VOA vial and adsorbent tubes properly labeled and stored on ice promptly after recovery?			
Was a trip blank set of adsorbent tubes included with each sample shipment to the laboratory?			
Was a deionized water trip blank included with each shipment of condensate samples to the laboratory?			
Was a set of adsorbance tubes collected as field blanks during each trial burn run?			

METHOD 0031 VOLATILE ORGANICS SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** ____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Were two sets of spiked resin blanks prepared and analyzed before the trial burn commenced?			
Were the chain of custody and request for analysis forms completed by the recovery personnel ?			
Does the tracking and labeling system clearly indicate that for each set of VOST tubes, the two Tenax tubes are to be analyzed together and the Anasorb® tube analyzed separately?			
Were the appropriate signature(s) affixed to the chain of custody forms?			

GENERAL OBSERVATIONS AND COMMENTS

ATTACHMENT U

METHOD 0023 PCDD/PCDF SAMPLING CHECKLIST

(4 Sheets)

METHOD 0023A DIOXIN AND FURAN SAMPLING CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Did the train components appear to be clean and were all glassware openings covered with Teflon® film, aluminum foil, or noncontaminating caps before the train was assembled?			
Was the train assembled by personnel in a manner that minimized contamination potential?			
Was the train constructed of the components and materials identified in Method 0023A (*See Figure 0023A: nozzle, heated probe, particulate filter, one condenser and recirculating cooling water system, one XAD-2 resin trap, four impingers*, control console, etc.)?			
Were the dry gas meter, thermocouples, nozzle, and critical orifice devices calibrated prior to the test? If yes, provide the calibration dates in the Comment column. If available, attach a copy of the calibration records.			Dry gas meter Thermocouples Critical orifice Nozzle
Were weather conditions adverse to sampling (rain, snow, etc.)? If so, describe the measures taken to protect the sampling equipment in the Comment column.			
Was the sampling area (i.e., platform) kept clean and orderly during the run?			
Were the traverse sample points determined in accordance with Method 1?			
Was a cyclonic flow check made before the start of testing? If yes, record the date and time the check was completed in the Comment column.			
Were stack gas oxygen, carbon dioxide, and carbon monoxide concentrations measured by orsat, fyrite, or CEMS?			
Was the manometer leveled and zeroed before the start of sampling? Were periodic checks made by the operator during the test run?			

METHOD 0023A DIOXIN AND FURAN SAMPLING CHECKLIST (CONTINUED)

Facility Name:_____ **Run Number:_____** **Observer Signature:_____**
Test No./Description:_____ **Run Start Time:_____**
Unit:_____ **Run Stop Time:_____** **Date of Observation:_____**

Observation / Requirement	YES	NO	Comment
Was the probe marked or alternative provisions made to ensure nozzle placements at the traverse point locations determined by Method 1?			
Was the filter inspected before being placed in the filter holder? Was the filter made of quartz or glass fiber?			
Was the filter supported by a glass or Teflon® frit?			
Was a leak check of the sample train performed before and after each port change? *(Note: Allowable leak rate is 0.02 cfm or 4% of the average sampling rate, whichever is less, at 15 inches Hg vacuum or lower if 15 inches is not exceeded during the run.*)			Time / Result Traverse # 1 Before _____ _____ Traverse # 1 After _____ _____ Traverse # 2 Before _____ _____ Traverse # 2 After _____ _____
Were pretest and post test leak checks conducted on the pitot tube?			
Was silicone grease used on any glassware connections?			
Was the nozzle tip positioned at the proper traverse sample point throughout the test run?			
Did operators make timely adjustments to sampling rates to maintain isokinetic conditions throughout the run?			
Was the annulus between the probe and the sampling port sealed during sampling?			
Was the sample gas temperature entering the resin trap maintained and demonstrated to be at or below 68°F throughout the test run?			
Was the sample gas temperature exiting the last impinger maintained at or below 68°F throughout the test run?			

METHOD 0023A DIOXIN AND FURAN SAMPLING CHECKLIST (CONTINUED)

Facility Name:_____ **Run Number:_____** **Observer Signature:_____**
Test No./Description:_____ **Run Start Time:_____**
Unit:_____ **Run Stop Time:_____** **Date of Observation:_____**

Observation / Requirement	YES	NO	Comment
Was the stack static pressure properly measured? At what traverse point was this determined?			
Was the sampling time uniform at each traverse sample point?			
Was the total sampling time at least 120 minutes?			
Were at least 3 dry standard cubic meters of gas sample collected during the run?			
Were the sample train and console adequately monitored by operators and did the operators properly log sampling data on field data sheets during the test run?			
Were dry gas meter readings recorded at each traverse sample point?			
Was the nozzle sealed with Teflon® film, aluminum foil, or a noncontaminating cap after being removed from the stack at the completion of the run and during leak checks?			
Was particulate matter carefully wiped from the external surfaces of the probe at the completion of the run?			
Was the temperature of the filter box and sample probe maintained at 248 ± 25°F throughout the test run?			
Did protracted or frequent "holds" occur during the sampling run? If so, describe the apparent cause and duration in the Comment column.			
Inspect the field data sheets. Are they clear and completely filled out?			
Were XAD-2 Resin Tubes packed, and spiked by the analytical laboratory with the 5 sampling surrogates for dioxins and furans?			
Were Field Blanks collected during each run?			

METHOD 0023A DIOXIN AND FURAN SAMPLING CHECKLIST (CONTINUED)

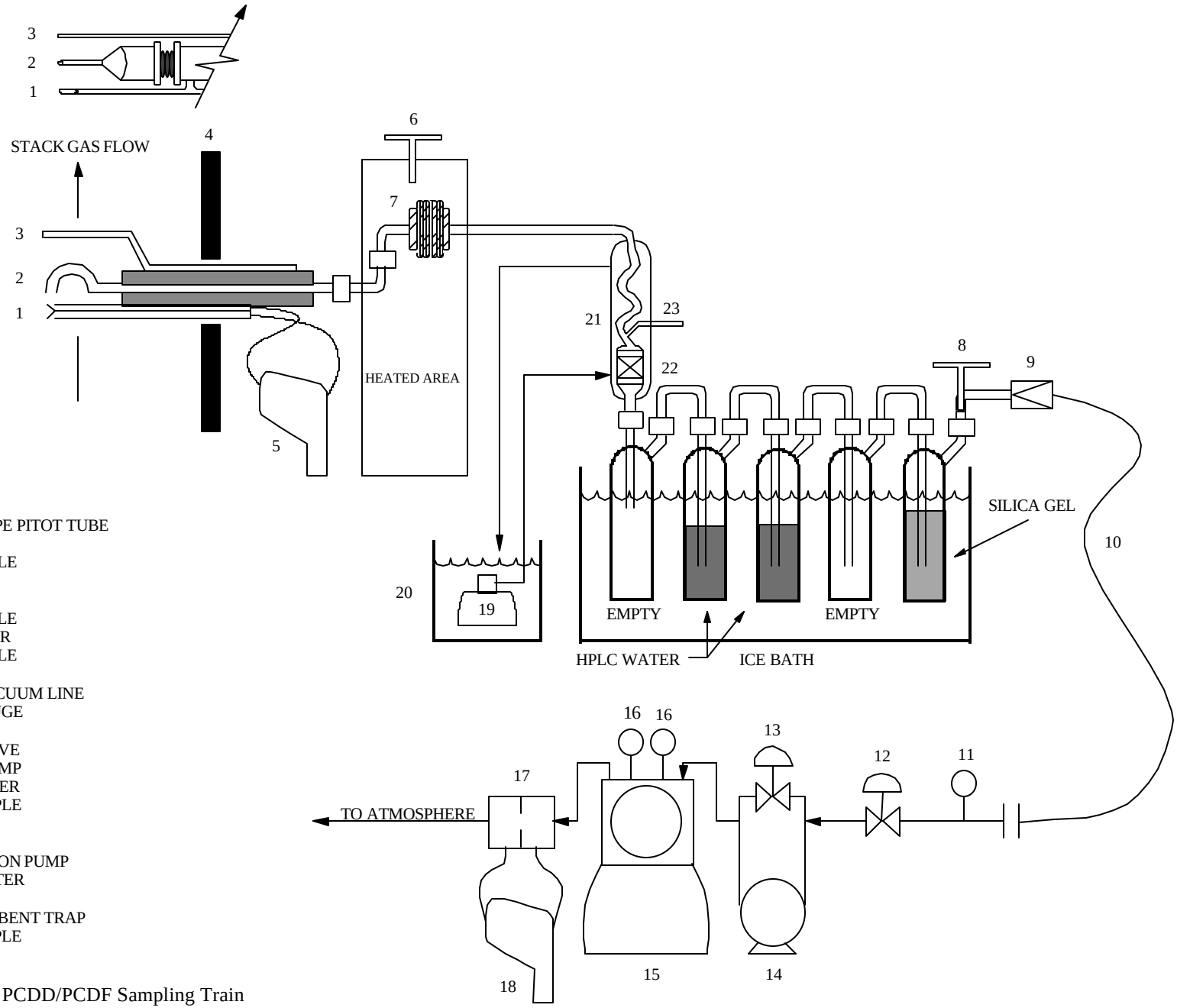
Facility Name:_____ **Run Number:_____** **Observer Signature:_____**
Test No./Description:_____ **Run Start Time:_____**
Unit:_____ **Run Stop Time:_____** **Date of Observation:_____**

Observation / Requirement	YES	NO	Comment
Was the Blank Train set up identically to the actual sampling trains and placed on the stack or at the base of the stack for the duration of one complete sampling run? Was the Blank Train leak checked and heated to temperature throughout the run?			
Were Train Blanks handled the same way as the actual sampling train?			
Were Reagent Blanks collected once during the three runs?			
Were Trip Blanks collected once for each sample shipment?			
Were Spiked Resin Blanks prepared and analyzed before the trial burn?			

GENERAL OBSERVATIONS AND COMMENTS

METHOD 0023A DIOXIN AND FURAN SAMPLING CHECKLIST (CONTINUED)

Facility Name:_____ **Run Number:_____** **Observer Signature:_____**
Test No./Description:_____ **Run Start Time:_____**
Unit:_____ **Run Stop Time:_____** **Date of Observation:_____**



1 REVERSE - TYPE PITOT TUBE
2 PROBE
3 THERMOCOUPLE
4 STACK WALL
5 MANOMETER
6 THERMOCOUPLE
7 FILTER HOLDER
8 THERMOCOUPLE
9 CHECK VALVE
10 FLEXIBLE VACUUM LINE
11 VACUUM GAUGE
12 MAIN VALVE
13 BY- PASS VALVE
14 AIR-TIGHT PUMP
15 DRY GAS METER
16 THERMOCOUPLE
17 ORIFICE
18 MANOMETER
19 RECIRCULATION PUMP
20 COOLING WATER
21 CONDENSER
22 XAD-2 ADSORBENT TRAP
23 THERMOCOUPLE

Figure 0023A. PCDD/PCDF Sampling Train

ATTACHMENT V

METHOD 0023A PCDD/PCDF SAMPLE RECOVERY CHECKLIST

(4 Sheets)

METHOD 0023A DIOXIN AND FURAN SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the sample train disassembled at the sample port location? If so, were the openings of the test train components (probe, filter bell, resin trap, impinger train, etc.) sealed before being relocated to the recovery area? Were the components sealed with Teflon® tape or noncontaminating caps?			
Was particulate matter visible on the filter? If so, describe the appearance (color, particle size, etc.) in the Comment column.			
Was there any evidence that particulate matter may have bypassed the filter? If so, describe in the Comment column.			
Was the filter recovered with tweezers and loose particulate inside the filter bell collected into the original petri dish? Was the petri dish sealed with Teflon® tape?			
Was the filter recovered intact without loss of particulate?			
Did the "front half" sample train recovery include: an acetone rinse followed by methylene chloride solvent rinses in triplicate while brushing of the nozzle, liner, front half of the filter bell inlet, optional cyclone, and a final rinse of the brush?			
Was a final rinse of the "front half" sample train components conducted using toluene?			
Were all of the "front half" rinses collected in labeled amber glass bottles with Teflon®-lined lids?			
Did the recovery personnel visually inspect the "front half" sample train components after the final rinses?			

METHOD 0023A DIOXIN AND FURAN SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Were EPA Level III cleaned and certified bottles used for collecting these "ultra trace level" samples? Were bottle certifications available for inspection? Alternately, the bottles and petri dishes can be cleaned by the prescribed glassware cleaning procedure in Method 0023A (Sections 4.2.4, 4.2.8, and 6.1.4).			
Were petri dishes made of glass? Note: Plastic is a source of phthalates and should not be used.			
Were glass containers the narrow neck or Boston Round design instead of the wide mouth Packer Bottle design?			
Were the openings of the resin trap sealed with tight fitting noncontaminating plugs or caps? Was the resin trap wrapped with aluminum foil and properly labeled?			
Was the moisture gain of each impinger recorded before recovery of the contents was commenced?			
Did the "back half" sample train recovery include triplicate acetone followed by methylene chloride rinses of the back half of the filter bell outlet, filter support, coil condenser, and interconnecting glassware?			
Was a final rinse of the back half components of the sample train conducted using toluene?			
Were the contents of the back half sample collected into an amber glass bottle with a Teflon®-lined lid?			
At the conclusion of the sample train recovery, were the openings of the sample train components sealed with Teflon® tape or noncontaminating caps?			

METHOD 0023A DIOXIN AND FURAN SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Were reagent blanks of the stock solutions collected? If so, indicate the sample identifiers in the Comment column.			Acetone _____ Methylene chloride _____ Toluene _____ Particulate filter _____
Was a blank sample train prepared and recovered at the sample location? How long did the blank train remain intact before recovery?			
Was the blank train placed on the stack or at the base of the stack for a period of time equivalent to one run, leak checked before and after the test, and heated to temperature for the duration of one test run?			
Were all samples properly labeled and stored on ice promptly after recovery?			
Were the chain of custody and request for analysis forms completed by the recovery personnel?			
Were the appropriate signature(s) affixed to the chain of custody forms?			
Were field blanks of the XAD-2 resin tubes collected during each run?			
Was a trip blank collected for each shipment of MM-5 train samples to the laboratory?			
Was a tracking system and labeling of samples conducted in such a way as to assist the laboratory in processing as separate samples the following train components: (1) The particulate filter, and the front half of the filter holder, nozzle and probe acetone, methylene chloride, and toluene solvent rinses (toluene rinse separate) (2) The XAD-2 resin tube and the back half of the filter holder, coil condenser, and connecting glassware acetone, methylene chloride and toluene solvent rinses (toluene rinse separate)			

METHOD 0023A DIOXIN AND FURAN SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was a tracking and labeling system used which was clearly understood by the observer and would this system be clear to the receiving laboratory?			
Was the recovery facility kept clean at all times?			

METHOD 0023A DIOXIN AND FURAN SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

GENERAL OBSERVATIONS AND COMMENTS

ATTACHMENT W

METHOD 0011 FORMALDEHYDE (ALDEHYDE & KETONE) SAMPLING CHECKLIST

(5 Sheets)

METHOD 0011 FORMALDEHYDE (ALDEHYDE & KETONE) SAMPLING CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Note: Acetone is a severe background contaminate for this train. Since acetone is required for use on any of the Method 0010 trains (semivolatiles, PCDD/PCDFs, PAHs, PCB, unspeciated mass) the Method 0011 equipment should be handled in a completely separate area.			
Did the train components appear to be clean and were all glassware openings covered with Teflon® film, aluminum foil, or noncontaminating caps before the train was assembled?			
Was the train assembled by personnel in a manner that minimized contamination potential?			
Were the first two impingers charged with 100 mLs each of the acidified DNPH solution?			
Was the third impinger left empty during testing?			
Was the train constructed of the components and materials identified in Method 0011 *(See Figure 0011: nozzle, heated probe, four impingers, control console, etc.)?*			
Were the dry gas meter, thermocouples, nozzle, and critical orifice devices calibrated prior to the test? If yes, provide the calibration dates in the Comment column. If available, attach a copy of the calibration records.			Dry gas meter Thermocouples Critical orifice Nozzle
Were weather conditions adverse to sampling (rain, snow, etc.)? If so, describe the measures taken to protect the sampling equipment in the Comment column.			
Was the sampling area (for example, the platform) kept clean and orderly during the run?			
Were the traverse sample points determined in accordance with Method 1?			

METHOD 0011 FORMALDEHYDE (ALDEHYDE & KETONE) SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was a cyclonic flow check made before the start of testing? If yes, record the date and time the check was completed in the Comment column.			
Were stack gas oxygen, carbon dioxide, and carbon monoxide concentrations measured by orsat, fyrite, or CEMS?			
Was the manometer leveled and zeroed before the start of sampling? Were periodic checks made by the operator during the test run?			
Was the probe marked or alternative provisions made to ensure nozzle placements at the traverse point locations determined by Method 1?			
Was a leak check of the sample train performed before and after each port change? *(Note: Allowable leak rate is 0.02 cfm or 4% of the average sampling rate, whichever is less, at 15 inches Hg vacuum or lower if 15 inches is not exceeded during the run.)*			Time / Result Traverse # 1 Before _____ _____ Traverse # 1 After _____ _____ Traverse # 2 Before _____ _____ Traverse # 2 After _____ _____
Were pretest and post test leak checks conducted on the pitot tube?			
Was silicone grease used on any glass connections?			
Was the nozzle tip positioned at the proper traverse sample point throughout the test run?			
Did operators make timely adjustments to sampling rates to maintain isokinetic conditions throughout the run?			
Was the annulus between the probe and the sampling port sealed during sampling?			
Was the DNPH impinger solution prepared within 5 days of sampling use in the field?			

METHOD 0011 FORMALDEHYDE (ALDEHYDE & KETONE) SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was all glassware washed with soapy water, rinsed with water followed by methanol and methylene chloride? The glassware must not be rinsed with acetone.			
Was the sample gas temperature exiting the last impinger maintained at or below 68°F throughout the test run?			
Was the stack static pressure properly measured? At what traverse point was this determined?			
Was the sampling time uniform at each traverse sample point?			
Was the total sampling time at least 120 minutes?			
Were at least 2 dry standard cubic meters of gas sample collected during the run?			
Were the sample train and console adequately monitored by operators and did the operators properly log sampling data on field data sheets during the test run?			
Were dry gas meter readings recorded at each traverse sample point?			
Was the nozzle sealed with Teflon® film, aluminum foil, or a noncontaminating cap after being removed from the stack at the completion of the run and during leak checks?			
Was particulate matter carefully wiped from the external surfaces of the probe at the completion of the run?			
Was the temperature of the filter box and sample probe maintained below 248 ± 25°F throughout the test run?			

METHOD 0011 FORMALDEHYDE (ALDEHYDE & KETONE) SAMPLING CHECKLIST (CONTINUED)

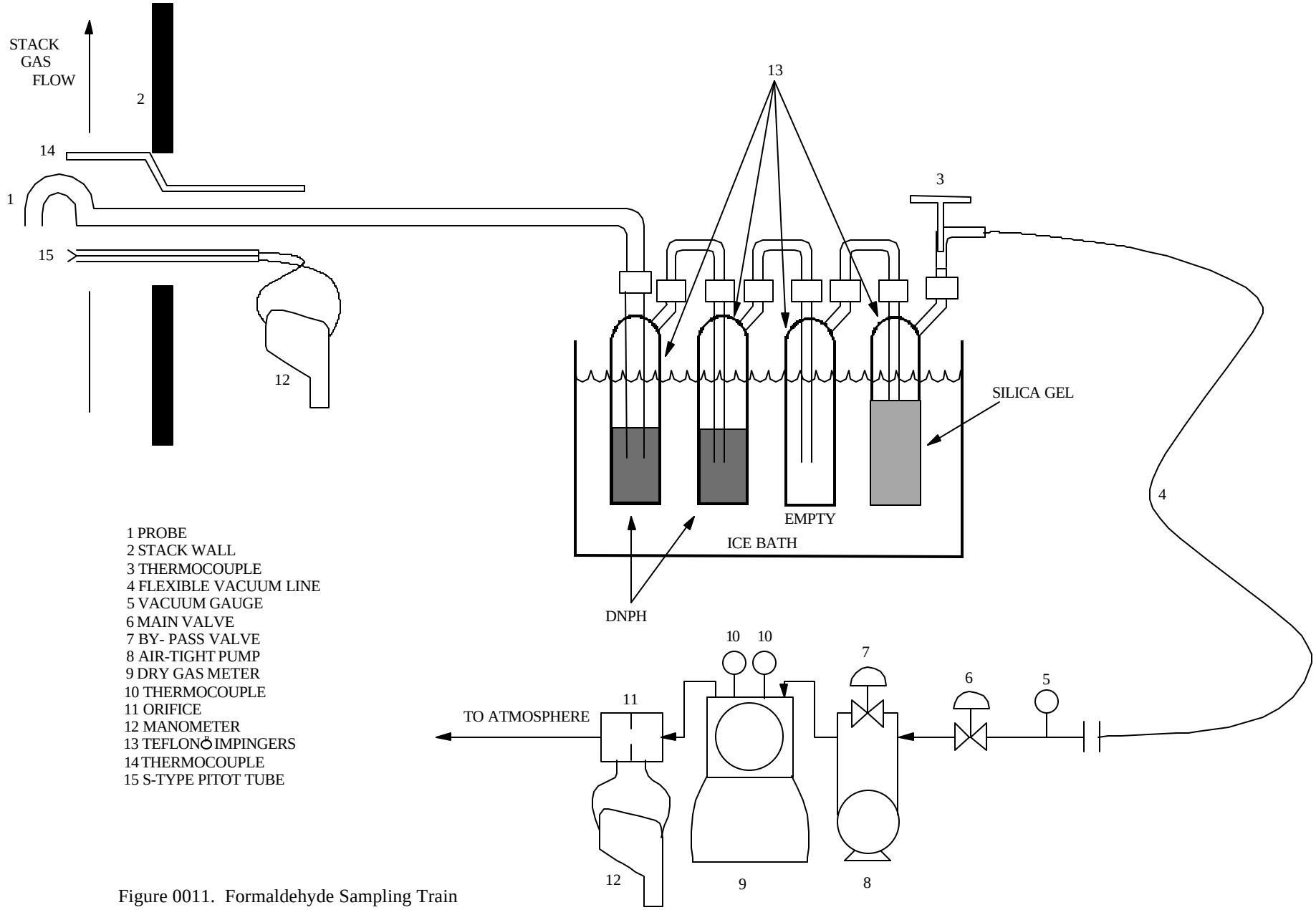
Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Was the sampling rate kept at or below 0.75 meters^3/hour? Higher sampling rates cause loss of scrubbing efficiency in the DNPH and cause carry over of the impinger contents.			
Did protracted or frequent "holds" occur during the sampling run? If so, describe the apparent cause and duration in the Comment column.			
Inspect the field data sheets. Are they clear and completely filled out?			
Was a Train Blank set up, leak checked and heated to temperature through one complete sampling run of the trial burn?			
Were Field Blanks collected during the trial burn?			
Were Train Blanks handled the same way as the actual sampling train?			
Were Reagent Blanks collected once during the three runs?			DNPH impinger solution _____ Methylene chloride _____ Deionized water _____
Were Trip Blanks collected once for each sample shipment?			
Were Field Spikes collected during the trial burn? Were field spikes applied to DNPH impinger solution according to the Trial burn Plan?			

METHOD 0011 FORMALDEHYDE (ALDEHYDE & KETONE) SAMPLING CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

GENERAL OBSERVATIONS AND COMMENTS



1 PROBE
2 STACK WALL
3 THERMOCOUPLE
4 FLEXIBLE VACUUM LINE
5 VACUUM GAUGE
6 MAIN VALVE
7 BY- PASS VALVE
8 AIR-TIGHT PUMP
9 DRY GAS METER
10 THERMOCOUPLE
11 ORIFICE
12 MANOMETER
13 TEFLON® IMPINGERS
14 THERMOCOUPLE
15 S-TYPE PITOT TUBE

Figure 0011. Formaldehyde Sampling Train

ATTACHMENT X

METHOD 0011 FORMALDEHYDE (ALDEHYDE & KETONE) SAMPLE RECOVERY CHECKLIST

(4 Sheets)

METHOD 0011 FORMALDEHYDE (ALDEHYDE & KETONE) SAMPLE RECOVERY CHECKLIST

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Note: The two DNPH impinger contents and rinses are to be analyzed separately from these trains in order to assess breakthrough. Carry over of the contents from the first impinger to the second should be avoided or the assessment will be invalid. Moisture knockout impingers or additional DNPH impingers may be added at the front of the train to prevent carry over.			
Was the sample train disassembled at the sample port location? If so, were the openings of the test train components (probe, filter bell, resin trap, impinger train, etc.) sealed before being relocated to the recovery area? Were the components sealed with Teflon® tape or noncontaminating caps?			
Were wash bottles made of Teflon or glass? Polyethylene wash bottles or plastic should not be used.			
Did the "front half" sample train recovery include: methylene chloride solvent rinses in triplicate while brushing of the nozzle and liner, and a final rinse of the brush?			
Were the fluid levels on the sample bottles marked in order to demonstrate that sample contents were not lost during shipments to the laboratory?			
Were all of the "front half" rinses collected in labeled amber glass bottles with Teflon®-lined lids?			
Did the recovery personnel visually inspect the "front half" sample train components after the final rinses?			
Were EPA Level III cleaned and certified bottles used for collecting these "ultra trace level" samples? Were bottle certifications available for inspection? Alternately, the bottles can be cleaned by the prescribed glassware cleaning procedure in Method 0011 (Section 5.4.1).			

METHOD 0011 FORMALDEHYDE (ALDEHYDE & KETONE) SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Were glass containers the narrow neck or Boston Round design instead of the wide mouth Packer Bottle design?			
Were the contents of the 1st DNPH impinger recovered into a separate amber glass bottle with a Teflon®-lined lid?			
Were the contents of the 2nd and 3rd impingers recovered in a separate amber glass bottle with a Teflon lined lid?			
Were the knockout impingers, DNPH impingers and connecting glassware rinsed three times with deionized water followed by methylene chloride?			
Was the moisture gain of each impinger recorded before recovery of the contents was commenced?			
At the conclusion of the sample train recovery, were the openings of the sample train components sealed with Teflon® tape or noncontaminating caps?			
Were sample containers sealed with Teflon tape prior to shipment to the laboratory?			
Were reagent blanks of the stock solutions collected? If so, indicate the sample identifiers in the Comment column.			Methylene chloride _____ DNPH solution _____ Deionized water _____
Was a blank sample train prepared and recovered at the sample location? How long did the blank train remain intact before recovery?			
Was the blank train placed on the stack or at the base of the stack for a period of time equivalent to one run, leak checked before and after the test, and heated to temperature for the duration of one test run?			
Were all samples properly labeled and stored on ice promptly after recovery?			

METHOD 0011 FORMALDEHYDE (ALDEHYDE & KETONE) SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

Observation / Requirement	YES	NO	Comment
Were the chain of custody and request for analysis forms completed by the recovery personnel?			
Were the appropriate signature(s) affixed to the chain of custody forms?			
Was a tracking system and labeling of samples conducted in such a way as to assist the laboratory in processing as separate samples the following train components: (1) First DNPH impinger contents and rinses (2) Second DNPH impinger composite with deionized water and methylene chloride rinses			
Was a tracking and labeling system used which was clearly understood by the observer and would this system be clear to the receiving laboratory?			
Was the recovery facility kept clean at all times?			

METHOD 0011 FORMALDEHYDE (ALDEHYDE & KETONE) SAMPLE RECOVERY CHECKLIST (CONTINUED)

Facility Name: _____ **Run Number:** _____ **Observer Signature:** _____
Test No./Description: _____ **Run Start Time:** _____
Unit: _____ **Run Stop Time:** _____ **Date of Observation:** _____

GENERAL OBSERVATIONS AND COMMENTS

ATTACHMENT Y

HOW TO CONDUCT TRIAL BURN TEST OVERSIGHT REVIEW CHECKLIST

(13 Sheets)

1.0 OVERVIEW OF TRIAL BURN OVERSIGHT

- ❒ Preparation Activities
- ❒ Conducting Field Activities
- ❒ Writing the TBO Report
- ❒ Stack gas sampling and recovery checklists (Attachments A through X)
- ❒ TBO Checklist (Attachment Y)

2.0 PREPARATION ACTIVITIES

Complete the following tasks before arriving at the facility to conduct trial burn oversight:

- ❒ Review TBP
- ❒ Review RBP
- ❒ Review QAPP
- ❒ Prepare a site-specific HSP
- ❒ Collect specific checklists to be completed on site
- ❒ Gather appropriate health and safety equipment

2.1 REVIEWING THE TRIAL BURN PLAN AND QUALITY ASSURANCE PROJECT PLAN

- ❒ General facility information
- ❒ Proposed stack gas sampling procedures
- ❒ Proposed waste feed and process residuals sampling procedures

2.1.1 Gathering General Facility Information

- ❒ Facility name
- ❒ Facility contact
- ❒ Facility address
- ❒ Facility telephone number
- ❒ U.S. EPA Facility Identification Number

- ❒ Facility employee responsible for trial burn
- ❒ Combustion units to be tested
- ❒ Proposed test schedule
- ❒ Health and safety requirements

2.1.2 Reviewing Proposed Stack Gas Sampling Procedures

Verify the accuracy of these TBP items by comparing them to the specified procedures identified in the guidance documents.

- ❒ Sampling methods
- ❒ Sample port locations
- ❒ Sampling time
- ❒ Sample recovery
- ❒ Sample holding times
- ❒ Sample handling procedures
- ❒ Field analysis of samples
- ❒ QA/QC procedures

2.1.3 Reviewing Waste Feed and Air Pollution Control Device Effluent Sampling Information

- ❒ Number of samples
- ❒ Volume of each sample
- ❒ Frequency of sampling
- ❒ Sample collection, handling, and storage procedures

2.2 DEVELOPING A HEALTH AND SAFETY PLAN

These elements should be included in an HSP for a TBO:

- ❒ Oversight objectives
- ❒ Site description and history
- ❒ Waste management practices

- ❒ Waste types and characteristics
- ❒ Hazards of concern
- ❒ Summary of hazardous substances
- ❒ Personal protective equipment
- ❒ Site personnel and responsibilities
- ❒ Emergency contacts
- ❒ Medical emergency
- ❒ Site map

3.0 CONDUCTING FIELD ACTIVITIES

The following specific field activities are conducted during a trial burn oversight:

- ❒ Conducting a pre-test meeting
- ❒ Conducting a pre-test facility survey
- ❒ Reviewing equipment calibration records
- ❒ Observing stack sampling
- ❒ Observing waste feed and APCS sampling
- ❒ Observing process operations
- ❒ Observing sample recovery
- ❒ Collecting trial burn test information
- ❒ Conducting daily meetings
- ❒ Compiling field documentation
- ❒ Observing audit gas sampling

3.1 CONDUCTING A PRE-TEST MEETING

- ❒ Explain the role of the oversight team to the trial burn personnel.
- ❒ Identify the individuals responsible for stack testing, waste feed sampling, APCS sampling, waste feed spiking, and recording process operating data.

- ❒ Determine the schedule and plan for the trial burn testing.
- ❒ Identify any deviations from the SOPs indicated in the TBP or RBP

3.2 CONDUCTING A PRE-TEST FACILITY SURVEY

- ❒ Examine the unit to be tested and observe general process operating procedures.
- ❒ Inspect the APCSs associated with the unit to be tested and observe general operating procedures.
- ❒ Identify the stack gas, waste feed, and APCS effluent sampling areas.
- ❒ Whether the stack includes a rain hat or an obstruction to the flow of the gas
- ❒ Sketch the stack gas sampling location.
- ❒ Examine the sampling platform or scaffold.
- ❒ Match the sampling trains with the appropriate sampling ports and become familiar with the order the trains will be employed.
- ❒ Inspect the stack gas sample recovery area and the field laboratory, if any.
- ❒ Determine the method and location of sample storage and labeling procedures.
- ❒ Identify persons responsible for monitoring process operating conditions and recording them at regular intervals.
- ❒ Identify the stack sampling personnel and their individual responsibilities.
- ❒ Identify the waste feed and APCS sampling personnel and their individual responsibilities.

3.3 REVIEWING EQUIPMENT CALIBRATION RECORDS

- ❒ Stack sampling equipment
- ❒ Feed spiking equipment
- ❒ Facility process control equipment
- ❒ CEMS
- ❒ Sampling methods

3.3.1 Reviewing Stack Sampling Equipment Calibration Records

- ❒ Pitot tubes

- ❒ Differential pressure gauges
- ❒ Temperature indicators
- ❒ Dry gas meters
- ❒ Probe nozzles
- ❒ Rotameters
- ❒ Barometer

3.3.2 Reviewing Feed Spiking Equipment Calibration Records

- ❒ Pump and flow meter calibration records
- ❒ Pump and flow meter maintenance procedures
- ❒ Certificates of analysis for spiking chemicals

3.3.3 Reviewing Process Control Equipment Calibration Records

- ❒ Waste feed flow meters
- ❒ Atomization air pressure transmitters
- ❒ Pyrometers
- ❒ Differential pressure gauges across APCSs
- ❒ pH meters
- ❒ Oxidation and reduction potential meters
- ❒ Integral orifice meters
- ❒ Thermocouples and temperature indicators

3.3.4 Reviewing Continuous Emission Monitoring System Calibration Records

- ❒ Latest CEMS certification report
- ❒ Automatic daily calibration records
- ❒ Periodic manual calibration records
- ❒ Certificates of analysis of calibration gases

3.3.5 Reviewing Field Laboratory Instrumentation Calibration Records

- ❒ Certificates of analysis
- ❒ Calibration records
- ❒ Maintenance procedures

3.4 OBSERVING STACK SAMPLING ACTIVITIES

- ❒ Are the sample ports properly cleaned before the test run to minimize the chance of sampling deposited material?
- ❒ Do the probe and filter heating systems measure up to 120 ± 14° C or 248 ± 25° F before the sampling begins?
- ❒ Are the probe and pitot tube positioned to point directly into the direction of stack gas flow?
- ❒ Are the openings around the probe and port hole blocked off during sampling to prevent an unrepresentative dilution of the gas stream?

The following specific sampling issues that should be carefully evaluated during a trial burn:

- ❒ Sampling port location
- ❒ Cyclonic flow check
- ❒ Traverse point calculations
- ❒ Sampling train assembly
- ❒ Leak checks prior to sampling
- ❒ Sampling train temperatures
- ❒ Field data logsheet
- ❒ Leak checks during sampling
- ❒ Sampling train disassembly
- ❒ Sampling checklists

3.4.1 Reviewing Sampling Port Location

- ❒ Stack diameter

- ❒ Distance from sampling port to the nearest disturbance in upstream and downstream directions
- ❒ Process unit diagram

3.4.2 Reviewing Cyclonic Flow Measurements

- ❒ Cyclonic flow check data sheet
- ❒ Cyclonic flow calculations

3.4.3 Traverse Point Location

- ❒ Traverse point calculation sheet

3.4.4 Reviewing Sampling Train Assembly

- ❒ Availability of clean area for train assembly to prevent any contamination
- ❒ Proper probe markings for traversing within the stack
- ❒ Use of correct amount of reagents in the impingers
- ❒ Storage of sorbent traps at below 20˚C
- ❒ Use of proper connectors and sealants
- ❒ Proper assembly of filter in the filter holder

3.4.5 Observing Leak Checks Prior To Sampling

- ❒ Visible breakage of glass components (visual inspection)
- ❒ Leak in Pitot tube
- ❒ Leak in fully assembled sampling train

3.4.6 Observing Sampling Train Temperatures

- ❒ Thermocouple locations
- ❒ Proper condenser operation
- ❒ Ice in the impinger box

3.4.7 Observing the Field Data Logsheet

- ❒ Number of sampling ports

- ❒ Number of traverse points
- ❒ Field data sheet

3.4.8 Observing Leak Checks During Sampling

- ❒ Field data sheet

3.4.9 Observing Sampling Train Disassembly

- ❒ Was the probe nozzle allowed to touch the stack wall or the platform?
- ❒ Was a final leak check conducted?
- ❒ Were the train components disassembled without any breakage or loss of sample?
- ❒ Were the train components properly capped, or sealed and labeled, before they were transported to the sampling recovery area?

3.4.10 Completing Stack Sampling Checklists

- ❒ Method-specific checklists

3.5 OBSERVING WASTE FEED AND AIR POLLUTION CONTROL DEVICE EFFLUENT SAMPLING

- ❒ Whether the liquid in the sampling line was drained long enough before a sample was collected
- ❒ Whether there are any visible air bubbles in the VOA vials
- ❒ Whether the samples are collected in accordance with the procedures specified in the approved TBP, RBP, and QAPP and at the specified frequency
- ❒ Whether logsheets—showing date, time, run number, and sampler name—are completed for each sample
- ❒ Whether sample containers are labeled—showing date, time, and identification number—with a permanent marker pen
- ❒ Whether sample containers are handled and stored in accordance with the procedures specified in the approved TBP and QAPP
- ❒ Whether sample traceability and chain-of-custody records are being initiated and maintained for each sample

3.6 OBSERVING PROCESS OPERATION ACTIVITIES

- ❒ Process
  - ❒ Combustion chamber temperature
  - ❒ Combustion gas temperature
  - ❒ Combustion chamber atomization and burner pressure
  - ❒ Combustion gas velocity
  - ❒ Excess air flow rate
  - ❒ Kiln rotational speed
  - ❒ CO concentration
  - ❒ O_2 concentration
  - ❒ Total hydrocarbon concentration
  - ❒ Unit production rates
- ❒ Waste feed
  - ❒ Feed rates
  - ❒ Chlorine input rates
  - ❒ Ash loading rates
  - ❒ Feed spiking compound rates
  - ❒ Atomization fluid pressure
  - ❒ Combustion chamber atomization and burner pressure
- ❒ Residue generation rates
  - ❒ Bottom ash
  - ❒ Fly ash
  - ❒ Scrubber mud and solid residue
- ❒ Cyclone
  - ❒ Pressure drop
  - ❒ Inlet temperature
- ❒ Dry scrubber
  - ❒ Reagent flow rate
  - ❒ Atomizer rotational speed
  - ❒ Atomizer nozzle pressure
  - ❒ Inlet temperature
  - ❒ Outlet temperature
- ❒ Baghouse
  - ❒ Pressure drop
  - ❒ Inlet temperature

- ❒ Electrostatic precipitator
  - ❒ Voltage
  - ❒ Current
  - ❒ Sparking rate
  - ❒ Flue gas flow rate
- ❒ Mist Eliminator
  - ❒ Pressure drop
- ❒ Quencher
  - ❒ Exit temperature
  - ❒ Water flow rate
- ❒ Packed tower scrubber
  - ❒ Pressure drop
  - ❒ Liquid flow rate
  - ❒ Effluent pH
- ❒ Venturi scrubber
  - ❒ Pressure drop
  - ❒ Liquid flow rate
  - ❒ Effluent pH
  - ❒ Gas-to-liquid flow rate ratio
  - ❒ Scrubbing reagent concentration
  - ❒ Scrubbing reagent flow rate
  - ❒ Maximum solids content in effluent
- ❒ Whether the data acquisition recorder (DAR) is a digital or an analog system
- ❒ Whether the digital readout agrees closely with the value on the strip chart recorder
- ❒ Whether the process operating conditions are close to the operating conditions specified in the approved TBP or RBP
- ❒ Whether there is a way of cross-checking the flow rate on the basis of the volume change in the feed tank; if yes, do the flow rates agree closely (± 10 percent)?

3.7 OBSERVING SAMPLE RECOVERY

- ❒ Reagents used and number of rinses with each reagent
- ❒ Whether the samples are recovered in accordance with the procedures specified in the approved TBP or RBP

- ❒ Whether the liquid levels on the sample containers are clearly marked with a permanent marker pen
- ❒ Whether the sample labels—showing identification number, date, and time—are affixed firmly to the sample containers
- ❒ Whether sample identification number logsheet and chain-of-custody records are filled out for each sample
- ❒ Whether sample containers are sealed and packaged securely, and chilled on ice in ice chests or coolers for transportation

3.8 COLLECTING TRIAL BURN TEST INFORMATION

- ❒ Whether the gas temperatures at different locations in the sampling train, during the trial burn test are consistently within the ranges indicated in the specific test methods
- ❒ Whether the volumes of the stack gas samples collected remained consistently within the ranges indicated in the specific test methods
- ❒ Whether the isokinetic sampling variations are within ±10 percent of the isokinetic sampling rate
- ❒ Whether all sampling trains have passed the final leak checks
- ❒ Whether the process operating conditions maintained during the trial burn test conform with the process conditions in the approved TBP or RBP
- ❒ Whether the waste feed and APCS effluent samples are collected in conformance with the procedures specified in the approved TBP or RBP

3.9 CONDUCTING DAILY MEETINGS

During the daily meetings, the oversight team should summarize the following:

- ❒ Trial burn test runs planned for the day
- ❒ Major changes to or deviations from the approved TBP or RBP
- ❒ Problems encountered and their resolution
- ❒ Progress and completion schedule of the trial burn

3.10 CONDUCTING FIELD DOCUMENTATION ACTIVITIES

Documentation of field activities should include the following:

- ❒ Process operating parameters for each run

- ❒ General impressions of stack sampling activities
- ❒ General impressions of stack sample recovery activities
- ❒ General impressions of waste feed and APCS sampling activities
- ❒ Deviations from and changes to the approved TBP or RBP

Photodocumentation should include the following:

- ❒ Combustion unit being tested
- ❒ Stack showing any obstructions to the flow of stack gases
- ❒ Waste feed storage tanks
- ❒ APCSs Units
- ❒ Location of stack sampling ports and sampling platform
- ❒ Location of CEMS probe
- ❒ Location of waste feed sampling
- ❒ Location of waste feed spiking
- ❒ Various stack sampling trains used during the trial burn
- ❒ Waste spiking system
- ❒ Waste feed and APCS sampling systems
- ❒ Modifications to or deviations from any standard sampling systems and procedures identified in the approved TBP or RBP

3.11 OBSERVING AUDIT GAS SAMPLING

- ❒ CEMS Relative Accuracy Test Audit
- ❒ CEMS Cylinder Gas Audit
- ❒ Volatile Organic Sampling Train (VOST)

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- ❒ PCDDs and PCDFs Audit

4.0 PREPARING THE OVERSIGHT REPORT

- ❒ Overview of the TBO

- ❒ Facility description
  - ❒ Engineering description
  - ❒ Characterization of hazardous waste feed stream
  - ❒ Process operating conditions
  - ❒ CEMS
- ❒ Implementation of the trial burn
  - ❒ Test conditions
  - ❒ Stack sampling
  - ❒ Waste feed sampling
  - ❒ Other sampling activities
  - ❒ Sample analysis
  - ❒ Process monitoring, control, and DAR
  - ❒ Trial burn completion schedule
- ❒ Field Observations
  - ❒ Daily activities of the observers
  - ❒ General impressions of the observers
  - ❒ Deviations from approved TBP or RBP
  - ❒ Other problems and issues, and their resolution
  - ❒ Conclusions and recommendations