United States
Environmental Protection
Agency

Office of Solid Waste
Washington, D.C. 20460

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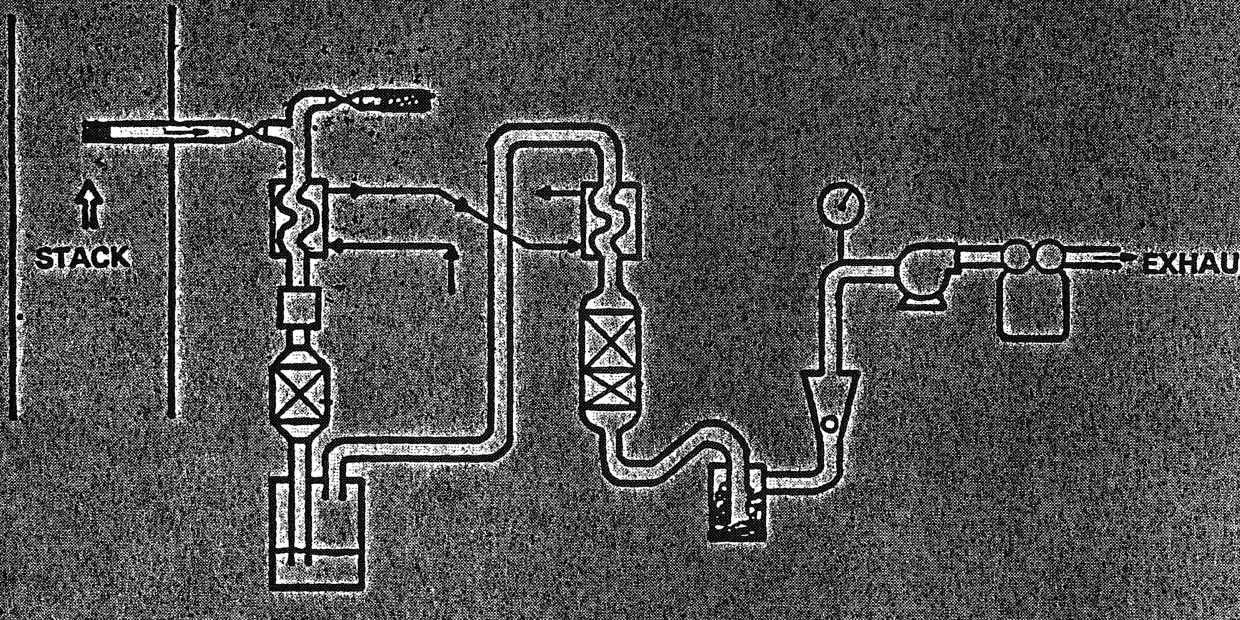
Solid Waste

EPA

TRIAL BURN OBSERVATION GUIDE



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Paul – Be sure & get one for GFS Judy

Q 2638

OFFICE OF EMERGENCY RESPONSE

MAR 14 1989

MEMORANDUM

RECEIVED
MAR 16 1989
OFFICE OF RCRA
Waste Management Division
U.S. EPA, REGION V

SUBJECT: Trial Burn Observation Guide

FROM: Joseph Carra, Director
Permits and State Programs Division

TO: RCRA Branch Chiefs
Regions I-X

Attached are copies of the Trial Burn Observation Guide to be distributed to incinerator permitting staff in your Regions and States.

The Trial Burn Observation Guide was developed to assist Regional and State regulatory staff in observing trial burns at hazardous waste incinerators. It provides background information about trial burns and identifies key personnel that can provide additional information and assistance. The guide also provides suggestions on how to prepare for observing the trial burn and how to conduct on-site activities during tests. Several checklists and data forms are included to aid in those preparations and on-site activities. We think this guide will be a useful tool particularly for less-experienced incineration permit writers in the Regional and State offices. This final report reflects valuable input and experience of the members of the EPA Incinerator Permit Writers Workgroup.

Of the copies provided, we request that at least two copies be sent on to each State within your Region. This guide will soon be available to the general public through the National Technical Information Service (NTIS). If your staff or any State permit writers have questions about the content or availability of this new document they may contact Lionel Vega of my staff at FTS/202-475-8988.

Attachments

cc: Waste Management Division Directors, (Regions 1-10) w/out attachments
Permit Section Chiefs, (Regions 1-10) w/out attachments
Incinerator Permit Writer Workgroup w/out attachments
Tom Kennedy, ASTSWMO

TRIAL BURN OBSERVATION GUIDE

FINAL REPORT

Prepared by

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Under Subcontract From

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Alexandria, Virginia 22314

Submitted to

U.S. Environmental Protection Agency
Office of Solid Waste (WH-562)
401 M Street, SW
Washington, D.C. 20460
Attn: Mr. Lionel Vega

In Response to

EPA Contract No. 68-01-7374
Work Assignment No. H20-08-01

MRI Project No. 8875-L(32)

February 16, 1989

PREFACE

This guidance document was prepared under U.S. Environmental Protection Agency (EPA) Contract No. 68-01-7374 (Work Assignment No. H20-08-01). The work assignment manager was Mr. Paul Gorman of Midwest Research Institute (MRI). This document was prepared under the direction of Mr. James Levin of A. T. Kearney Inc., and a quality assurance (QA) review of the document was performed by Mr. Burt O'Connell. Revisions have been made to reflect comments on earlier drafts provided by members of the EPA Permit Writers Workgroup.

Approved for:

MIDWEST RESEARCH INSTITUTE

Chatten Cowherd, Director
Environmental Systems Department

February 16, 1989

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EXECUTIVE SUMMARY

The purpose of this Trial Burn Observation Guide is to assist Regional and State regulatory staff in observing trial burns at hazardous waste incinerators. It provides background information about such tests and identifies other documents and personnel that can provide additional information or assistance. Subsequent sections of this Guide describe how to prepare for observing the tests and how to conduct on-site activities during the tests. Several checklists and data forms are included to aid in those preparations and activities.

Most of the contents of this Guide represent suggestions on how to observe trial burns. However, it does include information from EPA methods or other accepted methods that are specific requirements. It also contains some guidance points, taken from other guidance documents, that are usually viewed as required or at least highly advisable.

Although this document is targeted to regulatory personnel, it should also be useful to the the regulated community and those organizations that provide test services by helping them to be cognizant of what is expected of them. Distribution to members of the public might also serve in making them more aware of the complexity of trial burns and the detailed observations and scrutiny of the tests by the regulators.

SECTION 1.0

INTRODUCTION

The Trial Burn Observation Guide was prepared to assist Regional and State hazardous waste regulatory staff in observing incinerator trial burns. A premise of the Guide is that the observer's purposes in observing the trial burn are:

1. To verify that the tests are conducted properly, in accordance with the approved trial burn test protocol for the facility (i.e., the Trial Burn Plan and Quality Assurance Plan).

2. To ensure that trial burn data are of sufficient quality to establish that the incinerator is capable of meeting the required performance standards and to enable the permit writer to set enforceable permit limits.

It has been assumed in writing this guide that the permit writer/observer is familiar with hazardous waste incinerator regulations and is knowledgeable in the permitting process. It is also assumed that a Trial Burn Plan (TBP) and the associated Quality Assurance Project Plan (QAPP) have previously been submitted and approved by the Agency and are in the possession of the permit writer/observer. In this guide, it is also assumed that the reader is a permit writer/observer who has regulatory authority/responsibility for the test and is not merely a casual observer.

The next section presents background information on test observations. Section 3 is a guide to preparing for the trial burn, prior to actual arrival at the test site, while Section 4 contains a description of the on-site activities. Both Sections 3 and 4 contain checklists, guidance lists, and data tables which should be helpful to the observer in preparing for and conducting the trial burn observation. Section 5 is intended to help the permit writer prepare a report on the observation activities and results. The Appendix contains brief descriptions of actual problems that have been encountered by observers at trial burns and their resolutions.

SECTION 2.0

BACKGROUND ON TEST OBSERVATIONS AND AVAILABLE ASSISTANCE

Trial burn observations require considerable preparation to be completed before arriving at the test site. Much of this preparation involves a review of the Trial Burn Plan (TBP) and associated Quality Assurance Project Plan (QAPP), but also involves reviewing all the sampling methods designated in those documents. In addition, it provides a means of becoming more familiar with the incinerator operations.

It has not been assumed that the permit writer/observer necessarily has detailed knowledge of sampling methods. But, he should at least be familiar with them and their requirements, especially stack sampling methods. Therefore, the permit writer/observer should have some experience with the methods or have taken stack sampling training courses such as those offered by the U.S. Environmental Protection Agency (EPA) (see Table 1A).

Several other resources and guidance documents should be reviewed if the observer is not already familiar with them; these are listed in Table 1B. Another very valuable resource for help in answering questions that arise before, during, or after a trial burn are the EPA personnel who are experienced in trial burn observations and related issues. Some of these people are listed in Table 1C along with their office phone numbers. They can be of great help in answering questions or giving advice. Also, others who may be able to lend assistance and advice are the air programs staff in regional and state offices. They are usually well-experienced in many of the testing methods (e.g., particulate emissions) that are utilized in trial burns.

Probably the most difficult job for the permit writer/observer is using trial burn results to develop the operating permit. Well in advance of the trial burn, the permit writer should have already used the TBP, along with the other guidance documents listed in Table 1B, to prepare a draft operating permit, and should have discussed it with the permit applicant to establish a clear understanding of the anticipated operating limits for the incinerator. Quite often, such discussions better define the conduct of the trial burn and the data to be collected, and in some cases result in modifications to the test scenario of the trial burn. The permit writer/observer can use this draft to help ensure that all necessary data are collected and that the results achieve the objectives of the trial burn. It may also aid in making decisions about any changes requested after the observer is on site.

TABLE 1A. TRAINING COURSES AVAILABLE

- Air Pollution Training Institute (EPA training courses)
  Environmental Research Center, MD-17
  Research Triangle Park, NC 27711

- Andersen Samplers Inc.
  4215-C Wendell Drive
  Atlanta, GA 30336

- American Services Associates
  15049 Bel-Red Road, Suite 100
  Bellevue, WA 98007

TABLE 1B. REFERENCES AND GUIDANCE DOCUMENTS

1	"Guidance Manual for Hazardous Waste Incinerator Permits," USEPA, SW-966, July 1983.
2	"Sampling and Analysis Methods for Hazardous Waste Combustion," A report prepared by A. D. Little Inc. for USEPA, PB84-155845, February 1984.
3	"Test Methods for Evaluating Solid Waste--Physical/Chemical Methods," USEPA, SW-846, November 1986.
4	40 CFR 60, EPA Methods 1-10.
5	"Permit Writers Guide to Test Burn Data--Hazardous Waste Incineration," USEPA, EPA/625/6-86/012, September 1986.
6	"Practical Guide--Trial Burns for Hazardous Waste Incinerators," A report prepared by Midwest Research Institute for EPA, PB86-190246, April 1986.
7	"Guidance on Carbon Monoxide Limits for Incinerator RCRA Permits," Midwest Research Institute (tentative schedule 1989).
8	"Guidance for Continuous Monitoring of Carbon Monoxide at Hazardous Waste Facilities," Pacific Environmental Services (Draft).
9	"Hazardous Waste Incineration Measurement Guidance Manual," Midwest Research Institute, draft 1987 (document in progress).
10	"Guidance for Permit Writers for Limiting Metal Emissions from Hazardous Waste Incinerators," Versar (tentative schedule 1989).
11	"Guidance on Setting Permit Conditions and Reporting Trial Burn Results" (final is expected in early 1989).
12	"Proposed Methods for Measurement of CO, O_2, THC, Hydrogen Chloride, and Metals," Midwest Research Institute (tentative schedule 1989).

NOTE: For assistance in locating the above documents, contact Sonya Stelmack or Lionel Vega (see Table 1C for phone numbers).

TABLE 1C. EPA INCINERATION STAFF

	Area of expertise	Office phone no.	FTS No.
• <u>National staff</u>			
Larry Johnson, EMSL	Sampling and analysis	919-541-7943	629-7943
Don Oberacker, HWERL	Engineering and emission control systems	513-569-7510	684-7510
Bob Mourninghan, HWERL	Engineering and emission control systems	513-569-7430	684-7430
Sonya Stelmack, OSW	Policy and regulations	202-382-4500	382-4500
Bob Holloway, OSW	Policy and regulations	202-382-7936	382-7936
Lionel Vega, OSW	Policy and regulations	202-475-8988	475-8988
• <u>Regional staff</u>			
Stephen Yee, Region I		617-223-1925	573-9644
Don Wright, Region II		201-321-6764	340-6764
John Brogard, Region II		212-264-8682	264-8682
Gary Gross, Region III		215-597-7940	597-7940
Betty Willis, Region IV		404-347-3433	257-3433
Y. J. Kim, Region V		312-886-6147	886-6147
Henry Onsgard, Region VI		214-655-6785	255-6785
Joe Galbraith, Region VII		913-236-2888	757-2888
Nat Miullo, Region VIII		303-293-1668	564-1668
Nina Churchman, Region VIII		303-293-1509	564-1509
John Hart, Region IX		415-974-8142	454-8142
Larry Bowerman, Region IX		415-974-8390	454-8390
Catherine Massimino, Region X		206-442-4153	399-4153

Observing the process and sampling activities during the trial burn and documenting these observations for the record is critical to developing final permit conditions. Specific items regarding this phase are presented later in this document, but the observer needs to be aware of some other important aspects of observing trial burns and properly planning for the site visit. One of these is that trial burns are usually not an 8-to-5 activity. They often involve 12 to 16 hours per day for a number of days, including Saturday and Sunday. This lengthy time period includes preparation for each test and sample recovery. Also, process operating problems commonly contribute to the time required for each test. Quite frequently, problems arise before, during, or after each test that require decisions, or at least consultation with the permit writer/observer. Therefore, the permit writer/observer should plan to be on site at all times during the entire period of the test activity and realize that this will likely involve long hours in the field. It probably will also involve some decision making, which can be difficult, but can be partly anticipated and prepared for before arrival. This is discussed further in a later section. Also, there will likely need to be more than one observer during the trial burn (i.e., one for process operations and one for sampling activities, as has been done in many cases). It may be beneficial to have an enforcement representative present for at least part of the trial burn to gain familiarity with the incinerator operation in preparation for future inspections.

SECTION 3.0

PREPARATION FOR FIELD OBSERVATIONS

Preparations for field observations center on the need to become completely familiar with the approved test protocol to ensure quality data regarding performance criteria and permit conditions, as well as coordinating schedules and arrangements. The steps to be completed in preparing for the field observation are described below.

3.1 REVIEW OF TRIAL BURN PLAN

A thorough review and understanding of the TBP and QAPP are necessary in preparing for trial burn observations. One purpose of this is, of course, to become familiar with the type of incinerator, as well as its design and component parts (control devices, etc.). In addition, the emphasis in this review is to formulate a clear understanding of what tests are to be performed, what the incinerator operating conditions will be, and what samples are to be taken and by what methods. The observer should be familiar enough with the methods to know if the approved trial burn plan and methods specified therein are being followed and should be able to answer questions like those presented in Table 2 (see Note).

One of the most useful summary items normally contained in a TBP is a table that lists each stream to be sampled, the sampling method, and the analysis parameters for each sample (see example in Table 3). This table will likely be referred to frequently and should be flagged or copied for easy reference.

Note:

Table 2 and subsequent tables do not address metals sampling and analysis which may be part of the TBP since EPA was considering regulation of CO and metals emissions when this document was completed. See References 10 and 12 in Table 1B.

TABLE 2. CHECKLIST OF QUESTIONS TO BE ANSWERED BY REVIEW OF TBP AND QAPP

A. Process

TBP/QAPP page reference

__________ 1. How many different operating conditions are to be tested? __________

__________ 2. What are the main differences in the test conditions (and how might this be reflected in permit limits)?
Cond A __________
Cond B __________
Cond C __________
Cond D __________

__________ 3. Are 3 runs to be conducted at each test condition?
____

__________ 4. How long is each run? __________
How many runs per day? __________

__________ 5. How many waste feed streams will there be during the trial burn and what are their names?
1. __________
2. __________
3. __________
4. __________
5. __________

__________ 6. Who is responsible for the recording of process data?
____

__________ 7. Which process data are to be recorded and how often, and where is each monitor located in the process? (make separate list)

__________ 8. What methods are to be used for determining waste feed rates for liquids and solids?

	Name	Method
1.		
2.		
3.		
4.		
5.		

__________ 9. Will liquid feed rates be checked based on tank level change? __________

(Continued)

TABLE 2 (Continued)

TBP/QAPP page reference		
______	10.	What method will be used to indicate combustion gas velocity? ______
______	11.	If applicable, how are POHCs being spiked into waste feeds? ______
______	12.	What are the POHCs in each feed stream? Name / POHCs 1. ______ ______ 2. ______ ______ 3. ______ ______ 4. ______ ______ 5. ______ ______
______	13.	What are the metals to be sampled and analyzed in each stream or stack effluent? Name / Metals 1. ______ ______ 2. ______ ______ 3. ______ ______ 4. ______ ______ 5. ______ ______
______	14.	Is scrubber water recycled or once-through? ______
______	15.	What and where is any material added to neutralize HCl absorbed? ______ ______ ______ ______
______	16.	What types of instruments are used for continuous monitoring of CO and O_2? CO ______ O_2 ______
______	17.	What instruments are to be checked or calibrated prior to the trial burn? How will this be documented? (make separate list)
______	18.	What instruments are to be checked or calibrated each day of the trial burn (e.g., CO)? ______ ______ How will this be documented? ______ ______

(Continued)

TABLE 2 (Continued)

B. Sampling

TBP/QAPP
page reference

________ 1. What sampling method will be used for each feed stream?
1. ________
2. ________
3. ________
4. ________
5. ________

________ 2. What is feed sampling interval and amount sampled each time? (Indicate those to be composited.)

	Interval	Amount
1.		
2.		
3.		
4.		
5.		

________ 3. What is scrubber water sampling interval and amount sampled each time? (Indicate those to be composited.)

Name	Interval	Amount

________ 4. What method will be used to sample ash, and what is the sampling frequency and amount? Also, will ash be sampled and composited during each run or sampled after each run?
Method ________
Frequency ________ Amount ________

________ 5. What are the specific stack sampling methods to be used?
MM5 for SV-POHC or PCDD/PCDF ________
M5 for particulate/HCl ________
VOST for volatile POHCs ________
Orsat for CO_2 and O_2 ________

(Continued)

TABLE 2 (Continued)

TBP/QAPP
page reference

______ 6. What individual samples are to be recovered from each MM5 train?

Probe and front half rinse ______
Filter ______
XAD resin ______
Back half rinse ______
Condensate ______
Caustic solution ______

______ 7. What is planned sampling time and sample volume for M5 and MM5 trains?

	Time	Volume
M5	______	______
MM5	______	______

______ 8. What rinse solutions are to be used in recovery of M5 and MM5 trains?

M5 ______
MM5 ______

______ 9. How many VOST trap pairs in each run? ______
Sampling time for each pair? ______
Sample volume for each pair? ______
Number of blank pairs per run? ______

______ 10. Are samples to be handled under traceability or chain of custody? ______
Where is procedure specified? ______
______

______ 11. Is all sampling planned to be done simultaneously? (If not, list sequence.) ______
______

Comments: ______
______
______
______
______

TABLE 3. EXAMPLE SUMMARY TABLE FOR SAMPLING METHODS AND ANALYSIS PARAMETERS

Sample	Sampling frequency for each run	Sampling method[a]	Analysis parameter[b]
Liquid waste feed	Grab sample every 15 min (composited)	S004	V&SV-POHCs, Cl^-, ash, ult. anal., viscosity, HHV, metals
Solid waste feed	Grab sample of each drum (composited)	S006, S007	V&SV-POHCs, Cl^-, ash, HHV, metals
Chamber ash	Random sampling to collect representative composite after each run	S006	V&SV-POHCs, EP toxicity
Scrubber water influent and effluent	Grab sample every 30 min (composite) and VOA vial every 30 min	S004	V&SV-POHCs, pH, TDS
Stack gas	3-hr integrated sample	MM5 (0010)	SV-POHCs
	2-3 hr integrated sample	M5	Particulate, H_2O, HCl, metals
	Four pair of traps, 40 min each pair at 0.5 L/min	VOST (0030)	V-POHCs
	2-3 hr integrated sample in Tedlar gas bag	S011	V-POHCs[c]
	2-3 hr integrated sample in mylar gas bag	M3	CO_2 and O_2 by Orsat

(Continued)

TABLE 3 (Continued)

Sample	Sampling frequency for each run	Sampling method[a]	Analysis parameter[b]
	Continuous	Continuous monitor	CO (by plant's monitor)

[a] VOST denotes volatile organic sampling train.
MM5 denotes EPA Modified Method 5.
M3 denotes EPA Method 3.
SXXX denotes sampling methods found in "Sampling and Analysis Methods for Hazardous Waste Combustion," December 1983.
Methods 0010 and 0030 are from "Test Methods for Evaluating Solid Waste," SW-846, November 1986.

[b] V-POHCs denotes volatile principal organic hazardous constituents (POHCs).
SV-POHCs denotes semivolatile POHCs.
HHV denotes higher heating value.

[c] Gas bag samples may be analyzed for V-POHCs, only if VOST samples are saturated and not quantifiable.

The TBP is intended to specify the test conditions and the sampling/analysis methods. However, it must be realized that unforeseen circumstances do occur and some changes from the TBP may be necessary after arriving on site. These may be minor changes or major differences in sampling methods or test conditions. For example, the TBP may involve two test conditions, but the applicant may conclude that he cannot achieve a certain test condition. He might therefore request deletion of testing at one of the test conditions, even though the deletion will result in less desirable permit operating limits.

The observer must make decisions, based on the on-site field situation, about proposed changes or any alternatives by determining the following:

- Is the proposed change necessary to ensure that adequate sampling is performed or that realistic operating conditions can be set?

- Does the procedure or change compromise the test results (i.e., the performance results)?

- Does the procedure or change impair ability to set necessary permit limits?

- For a new incinerator, are proposed changes within operating conditions specified in the permit for the trial burn period?

In considering any change relative to the above criteria, the observer can consider minor changes to be discretionary. However, major changes are another matter because the TBP has presumably been the subject of extensive review and negotiation prior to its approval, as well as public comment for new facilities. Thus, even for interim status facilities, any major changes must be made with caution and in consultation with appropriate EPA or State staff. At new facilities, a major change could require the trial burn to be delayed until after public notice of the changes, and no changes should be allowed in operating conditions that are less stringent than those specified in the trial burn permit.

Obviously, the observer cannot know all the possible procedural problems or changes that may come up in the field, but can anticipate that such problems probably will come up and prepare for them to some extent. That is, in preparation for the trial burn, the observer can become familiar with guidance documents and also be prepared with names and phone numbers (including home phone numbers) for others who may be more experienced in trial burns and sampling methodologies or who may have higher supervisory responsibility or authority. The observer should therefore prepare a list of names and phone numbers (office and home) for people in his own agency who can help, as well as his immediate supervisor. Of course, the EPA personnel listed previously in Table 1 can also be of help. In certain situations, the guidance points summarized in Table 4 may be helpful. Also, the Appendix to this document briefly describes some of the actual problems that have been encountered and their resolutions at the time. However, such problems and their resolutions are very site-specific.

TABLE 4. SUMMARY OF SPECIFIC GUIDANCE POINTS[a]

- Three replicate runs are required for each set of incinerator operating conditions. Results from each run must comply with RCRA requirements for DRE, particulate emissions, and HCl emissions (and any requirements on CO and metals emissions).

- Only one run per day should be scheduled, unless the sampling requirements are quite simple.

- RCRA regulations call for continuous monitoring of combustion temperatures, waste feed rate, CO, and the combustion gas velocity indicator, and any other parameters as specified in the Trial Burn Plan.

- Waste feed samples should be collected every 15 minutes and composited over the entire period of stack sampling.

- Each drum burned during the trial burn should be sampled and composited unless the applicant can justify otherwise.

- All other process samples (scrubber water, ash, etc.) should be taken every 30 minutes over the entire period of stack sampling and composited.

- Sampling should not begin until the incinerator has reached steady state on waste feed for at least 30 minutes.

- Sampling should continue through incinerator operating abnormalities unless the waste feed cutoff system shuts the incinerator down. If sampling is stopped during a trial burn, the test may be completed using the same sampling trains if the burn is completed on the same day it was started.

- Separate sampling trains should be used for semivolatile POHCs and for particulates. This is necessary since drying the particulates and probe rinse prior to weighing may result in loss of semivolatile POHCs.

- Hydrogen chloride emissions may be determined based on analysis of impinger aliquots from an M5 particulate train or a separate HCl train, but not from an MM5 train that includes the XAD resin trap.

- Minimum stack sampling time for each run (actual sampling time not including time for port changes, changing VOST trap pairs, etc.) should be 1 hr for EPA Method 5 (M5), semi-VOST, and VOST. Data from less than 1 hr of sample collection would be an invalid test run. Two hours of stack sampling time is recommended as optimal. A minimum of three VOST trap pairs per run should be taken. A fourth pair is often taken in case one pair is broken or lost due to analysis problems.

(Continued)

TABLE 4 (Continued)

- All sampling required for a test run in the trial burn should, whenever possible, be conducted concurrently, with only the normal minor differences associated with different sampling methods (e.g., MM5 and VOST). However, differences in sampling period start and finish due to sampling problems are allowable (e.g., particulate train fails a leak check at port change and sampling must be restarted with a new train, or a VOST trap is broken at the end of the sampling period so another pair must be run). However, all waste feed sampling must be continued for the entire period, and possibly any water effluent or ash sampling. Also, the incinerator must continue at the same process operating conditions with collection of the operating data for the entire period.

- The final leak check for VOST should be run at the highest vacuum used during the sampling run but not less than 1 inch of mercury vacuum.

- A sampling train which develops problems during a trial burn run may be validated on a case-by-case basis if it can be shown that the results were not significantly biased. For example, if an M5 train passed the leak check at the end of the first port but failed the confirming leak check at the beginning of the second port due to a probe liner being broken during port change, the test could be allowed to continue after replacement of the probe liner and including rinsing of the broken liner for particulate recovery. However, if the train failed the leak check at the end of the first port, the sample would be invalid, even if it were believed that the probe liner was broken as the probe was removed from the port (i.e., it is not possible to know if the probe liner was already broken before removal from the port).

- Volatile POHCs should always be sampled with the VOST if possible. Samples may be collected in bags if VOST samples cannot be performed. The bag sample procedure is less desirable due to potential problems with adsorption in the bag and loss of sample. Stability of the POHC to be sampled in the bag should be checked prior to sampling, if this method is used. Field blanks are essential with bag sampling.

- VOST field blanks are required, and VOST trip blanks and laboratory blanks are highly recommended.

(Continued)

TABLE 4 (Continued)

- The front (Tenax) trap and back (Tenax/charcoal) trap must be analyzed separately for each pair of traps from each run. Separate analysis of each trap is required to check for indication of breakthrough. As a guideline, breakthrough is not normally expected if the amount of analyte (POHC) collected on the back trap is less than 30% of the amount on the front trap. For values higher than 30%, additional factors, such as how close the calculated DRE is to the performance standard, need to be considered. Specific criteria, including both a level where breakthrough should be suspected and additional factors such as that mentioned above are being developed for inclusion in Reference 9 on Table 1B.

- Traceability procedures must be used for handling all samples. Full chain-of-custody procedures are typically much more labor intensive but may be used at the applicant's option.

- The results of the analyses for particulate emissions, HCl emissions and removal efficiency, and DRE should be reported separately for each run, and should not be averaged for the trial runs. This does not preclude averaging multiple samples taken during each run.

- VOST analytical results should be reported as an average value for each run (as total ng/L of sample). This amounts to dividing the total quantity (ng) on all traps by the total sample volume (L) for all traps. Values for individual traps should also be reported in order to evaluate the possibility of breakthrough.

[a] The guidance points in this table will be presented in more detail in the final version of Reference 9 listed in Table 1B.

It is expected that those performing the trial burn will inform the observer about any proposed changes or problems and request his concurrence. Also, the observer may identify some procedure or method variation of concern. These should be discussed and advice should be requested from his office or experts, if necessary. Usually they can be resolved on site without too much difficulty. However, in preparing for the test, the observer must recognize that it may be necessary to make some difficult decisions on the spot, often under stress and at unusual hours. For example, if a number of process upsets have occurred, the observer may have to consider the run invalid. This can cause some consternation, especially when the decision is not clear-cut. Therefore, it may be helpful if the observer recognizes this possibility and decides in advance whom they may want to consult with and/or who must be informed.

3.2 REVIEW OF PERMITTING NEEDS

The trial burn has two main purposes. The first is to demonstrate that the facility can achieve the performance requirements for DRE, HCl, and particulate, and that there are no other concerns (e.g., fugitive emissions) or problems. (It should again be noted that performance requirements for CO and metals were being considered by EPA when this document was written.) The second main purpose of the trial burn is to provide data necessary to establish permit operating limits. Ordinarily, the performance requirements are demonstrated in three replicate runs, each of which must show compliance. It is possible, however, that problems might develop in conducting the three replicate runs. The observer should be aware of this possibility; and may need to "recommend" an additional run if there is doubt about validity of one of the three replicate runs.

As mentioned in Section 2, preparing for the trial burn observation should include using the information from the TBP and from a preliminary draft of the permit operating conditions. One intention of this effort is to ascertain that all parameters for which permit limits may be established will be measured and reported in the trial burn results. A list of such parameters is shown in Table 5, but others may be added to the trial burn plan at the discretion of the permit writer (see Ref. 11 in Table 18). It is partly for this reason that a preliminary draft of the permit operating conditions should have been prepared and discussed with the applicant before the trial burn. If a preliminary permit is drafted, the permit writer/observer will be better prepared to examine how each parameter is measured and confirm that all necessary data are being recorded during the trial burn. It is also helpful in knowing how the data will be monitored and reported thereafter, so as to enforce the limits imposed.

3.3 ARRANGEMENTS/SCHEDULING

Coordinating the efforts of all parties involved in the trial burn is complex and important. Scheduling the test involves much coordination, and the schedules often change. The permit writer/observer has many duties related to scheduling and coordination. A checklist of these duties is given in Table 6, and some of these are explained further in the paragraphs below.

TABLE 5. PARAMETERS FOR WHICH PERMIT LIMITS MAY BE ESTABLISHED

Liquid waste feed rate(s)
- % Cl or Cl input rate
- % ash or ash input rate
- Minimum HHV
- Maximum heat input Btu/hr
- Liquid feed atomizing fluid type
- Liquid feed atomizing fluid pressure

Solid waste feed rate
- Container size (or weight)
- Volatile content
- Frequency of feeding
- % Cl or Cl input rate
- % Ash or ash input rate

Indication of combustion gas velocity

Combustion chamber pressure

Operating temperature

CO concentration

O_2 concentration

Control device
- specific parameters:
  - Venturi ΔP
  - Venturi water feed rate

  - Packed tower water feed rate
  - Scrubber water blowdown rate
  - Scrubber water pH

  - Baghouse ΔP
  - Baghouse cleaning cycle time

  - Spray tower reagent flow rate
  - Spray tower atomizing speed or pressure
  - Spray tower inlet gas temperature

  - ESP voltage
  - ESP amperage
  - ESP spark rate
  - ESP rapping rate

Note: Liquid waste viscosity and burner turndown ratio may be permit limits but are usually based on manufacturers' data for the feed nozzles.

TABLE 6. CHECKLIST OF SCHEDULING/COORDINATION ACTIVITIES

Facility Name: ______________________________ Date completed or comment

- Call the permit applicant to find out the following: ____________

  a. Who is responsible for the trial burn activity and scheduling? ____________

  b. Who is the lead person for the field sampling (i.e., sampling and analysis contractor)? ____________

  c. Who is your main contact at the test site? ____________

  d. Get directions to the test site. ____________

- Call all of the above to inform them of your plans and discuss coordination of your activities. ____________

- Determine if you will be required to sign anything upon arrival at test site. If so, ask that copies of forms be sent to you for review, since you should not sign secrecy agreements or injury waiver forms. You must arrange for access to the site without signing such forms. (Contact your Office of Regional Counsel or corresponding State office, if needed.) ____________

- Arrange for a meeting to discuss preliminary draft permit parameters and conditions, if that has not already been discussed with the applicant. ____________

- Try to determine what other regulatory personnel plan to be on site for the trial burn. Make sure qualified personnel will be present to observe all the procedures, if the permit writer/observer is not qualified. ____________

- Establish one of the regulatory personnel (permit writer) as a coordinator and primary contact for plant problems and decisions. ____________

- Arrange for EPA audit cylinder, if required, or check that arrangements have been made. ____________

(Continued)

TABLE 6 (Continued)

Facility Name: ______	Date completed or comment
• Arrange for field audit or obtaining audit samples, if required. Be sure auditors know directions to test site, and are kept informed about changes in test schedule.	______
• Arrange for pretest briefing to take place as early as possible after arrival on site. (Prepare notes on items to be discussed in prebriefing per Table 7.)	______
• Make all travel arrangements (but it is wise to make return plans flexible).	______
• Determine any special arrangements or requirements at the test site (e.g., safety) or permission required for taking a camera if desired.	______
• Obtain safety shoes, safety glasses, and hard hat. Plan on foul weather and getting dirty.	______
• Obtain training and certification in use of respirators or safe breathing apparatus that might be needed.	______

Comments: ______

Two items (if they are needed) must be arranged well in advance of the testing. One is the EPA audit cylinder. These cylinders are available from EPA and are encouraged for use in auditing VOST sampling and analyses. If VOST is being used, the TBP or QAPP should indicate if an audit cylinder is to be used. Use of an audit cylinder should be arranged at least 30 days in advance. Also, the permit writer/observer may wish to confirm that those performing the sampling know that they will need to take samples from the audit cylinder as specified in the TBP or QAPP, because additional VOST sampling traps must be prepared.

The audit cylinders are available only to EPA and state agency staff and their contractors. The cylinders cannot be ordered by private organizations, so the permit writer must make these arrangements with the EPA contact as shown below. When doing so, the permit writer will need to provide information on the facility, purpose of the audit, POHCs and their expected concentration, and to where and whom to send the audit cylinder.

Audit Cylinders Available From:

Mr. Robert Lampe
U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory
Quality Assurance Division
Research Triangle Park, NC 27711
Phone: (919) 541-4531

The second item that must be arranged for, if needed, is any external field auditing of sampling activity or the need to obtain field audit samples. Field auditing, in this context, requires special equipment (e.g., critical orifices) and special expertise. EPA sometimes uses experienced sampling contractors who have the necessary equipment. Therefore, initially determine if field auditing is necessary or if it might have already been arranged. The need for such auditing may depend on the experience level of those conducting the trial burn testing, or sensitive issues surrounding the test that make auditing advisable. If field auditing is necessary, the permit writer must make all the contractual arrangements at least 30 days in advance. Also, he should develop an audit plan with the contractor to determine exactly what is to be audited, so that all the necessary items can be prepared (e.g., gas cylinders of known concentrations, critical orifices, etc.).

Field audits may involve taking of audit samples or check samples. This also requires considerable planning and arrangements because all sample bottles must be properly prepared, handled, stored, and shipped. Also, the trial burn sampling contractor needs to know about the plan to take audit or check samples since his help will likely be needed as part of that activity.

It is emphasized that the idea of taking audit samples needs to be thought out well in advance, very early in the trial burn planning process. In this regard, the permit writer/observer needs to decide:

- What audit samples need to be taken and why?
- How many need to be taken?
- What are they to be analyzed for and by what methods?
- Who will analyze them?

Again, if the permit writer/observer deems it necessary to obtain audit samples, specific arrangements need to be made at least 30 days in advance of the testing, along with a clearly formulated plan for this activity. This will allow sufficient time for the auditors to prepare all the necessary equipment and prepare sufficient sample containers that have been properly precleaned.

Besides the preliminary drafting of the permit conditions, another key item listed in Table 6 is the pretest briefing that needs to be done soon after the observer arrives on site. A suggested outline of items that should be discussed is given in Table 7.

Another key item is making final travel arrangements. The observer should plan to arrive on site before noon on the day before the first run is scheduled. This should provide sufficient time to meet the responsible individuals on site, become oriented with the process and all data recording and sampling locations, and hold the pretest briefing.

Several days prior to leaving for the site, the observer should refer to Table 8, which provides a checklist of items that usually need to be taken to the site or checked before leaving.

TABLE 7. OUTLINE FOR PRETEST BRIEFING

- Give name, title, and agency.

- Explain your responsibility regarding trial burn:
  - Assessing performance results
  - Writing the operating permit

- Explain what activities you plan to observe:
  - Taking of process data
  - General plant operating conditions and procedures
  - Liquid feed sampling
  - Solid feed sampling
  - Scrubber water sampling
  - Stack testing preparation
  - Stack testing procedures
  - All sample recovery activities

- If your responsibility includes observing certain test activities for which you have very limited knowledge or experience (e.g., MM5 stack sampling), you may want to explain this fact and ask for their help in understanding the procedures.

- Explain that you expect all the sampling to be done in accordance with the procedures given in the TBP and QAPP. Solicit advice about any deviations that any attendees may already be aware of.

- Ask who is responsible for logging of process data.

- Inform them that you need continuous recorders clearly marked with run number and date, and marked to show start/stop time of each run, and any periods when sampling was stopped. Let them know you want to initial some or all recorder sheets or data sheets, and specify them in a list.

- Ask them to seek you out to discuss any procedural variations or any changes in the testing that may come up so that possible problems can be resolved before they jeopardize the results.

- Explain that you and everyone else are there to obtain valid results.

- Tell them that you will inform them immediately if you observe anything that you believe could jeopardize acceptability of results. Ask whom to contact. Also, find out the name of the crew chief.

- Raise any questions or procedural problems that may have come up during the tour of facility.

- Determine plans and schedule for the next day's testing and all succeeding tests.

- Inquire as to what safety equipment is required in what areas of the plant.

TABLE 8. CHECKLIST OF ITEMS TO BE TAKEN ON SITE

- Copy of TBP and QAPP
- Copy of all sampling methods referenced in TBP and QAPP
- Copy of 40 CFR; Parts 264 (subpart O) and 270
- List of names and phone numbers of authorized personnel who can provide guidance and answer questions about trial burn procedures and sampling methods
- Copy of table summarizing sampling locations and methods
- Copy of this observation guide and extra copies of tables to be used in the field, with completion of entries that can be made before arrival on site.
- Directions to motel and from motel to test site
- Name of person to contact upon arrival at site
- Checklist of items to discuss in pretest briefing
- Bound notebook and indelible ink pens (black) for recording data and all observations, etc.
- Hard hat, safety glasses, safety shoes
- Bad weather gear
- Camera and plenty of film (prior arrangements usually must be made for taking a camera on site)
- Check to see if EPA audit cylinder has been delivered or arranged
- Before leaving, call to be sure the testing is "on schedule." Reaffirm schedule with any others who need to know (e.g., auditors).

Comments: ____________________

SECTION 4.0

ON-SITE ACTIVITIES

Once on site, the permit writer/observer has many activities to perform and many items to cover. Participation in on-site activities and attention to all these items are critical. These activities and items are discussed in this section in the following order:

- Pretest orientation
- Observation of process operations
- Observation of field sampling/analysis activities
- Personal safety
- QA/QC audits
- Major deviations/problems
- Documentation of activities

4.1 PRETEST ORIENTATION

The permit writer/observer should first tour the incinerator facility with someone who is knowledgeable about the process and, if possible, knowledgeable about the TBP (i.e., the test conditions and the sampling locations). This also usually presents the opportunity to meet key participants who have lead responsibility on site, including:

- Permit applicant's representative
- Process operations (manager, operators)
- All sampling activities (project leader)
- Stack sampling activities (crew chief)

After the initial tour, it is advisable for the permit writer/observer to take another review tour of the incinerator, either escorted or unescorted, in order to concentrate on the details of the upcoming test and the TBP. Some of the objectives and items to be covered in that tour are listed in Table 9.

Usually, the incinerator tour and efforts to cover the items listed in Table 9 raise some questions for the permit writer/observer. The observer must then seek out the responsible personnel to try to answer the questions and resolve any procedural discrepancies or changes.

TABLE 9. OBJECTIVES OF INCINERATOR FACILITY TOUR

- Observe general process operations and personnel.
- Identify each instrument from which process data will be recorded (scale, units of measure, instrument number, color of ink for each parameter on strip chart) (see Table 11).
- Examine log sheets to be used by personnel recording process data.
- Determine who will be responsible for marking each strip chart to identify correct time, test periods, and instrument number.
- Determine exact location of each sampling point, how samples will actually be taken, and by whom.
- Determine location of continuous monitors for CO, etc., and make arrangements to be present to observe calibration procedures.
- Examine stack sampling location. Determine what test ports will be used for M5, MM5, VOST, and Orsat.
- Prepare sketch of stack sampling location.
- Tour field laboratory. Observe preparation of stack sampling trains or find out when these preparations will take place so you can be present to observe. Investigate method of determining isokinetic sampling rate for M5 and MM5 sampling trains.
- Determine location and method of storing samples.
- Determine labeling system for samples.
- Find out how runs will be numbered so that your records can be consistent with sampling data.
- Record names, addresses, and phone numbers of all key participants.

Soon after arrival on site, the observer will need to arrange the time and place for a pretest briefing with all the responsible participants on site. It should take place as early as possible, preferably before the end of the observer's first day on site. In this pretest briefing, the points listed previously in Table 7 need to be covered. It will also be a good time to bring up any questions, deviations, or problems that the observer may have after his tour of the facility. The final schedule for the next day's testing and tentative schedule for succeeding tests should also be clarified at this time.

4.2 OBSERVATION OF PROCESS OPERATIONS

The key to observing process operations is to circulate through the facility, keeping your eyes and ears open. Try to keep questions to a minimum once testing has begun. The observer should make every effort to have any questions answered, without being a nuisance or interfering with people's jobs. Usually, someone will be available who is not directly involved but will be able to answer questions. Avoid lengthy discussions with operators or other observers on site during the testing so as not to be distracted from the ongoing activities.

When observing process operations, concentrate on the process data that will be used in setting permit limits and the process data critical to the performance requirements. For the latter, the waste feed rates are the important process parameters used in calculating DRE. Therefore, the permit writer/observer should examine all the feed rate monitoring systems and utilize the checklist shown in Table 10.

The other critical part of observing process operations is ensuring that all the data are being collected for those parameters which will be specified as permit operating limits. A list of those parameters should be available if a draft of permit conditions was prepared (see Table 5). They should also have been listed in the TBP. These sources may be used to prepare a process data logsheet using the logsheet form given as Table 11 and Table 12, and use the form in Table 12 to record the readings for the critical process parameters and compare them against the expected values for the trial burn. Similarly, logsheets for the air pollution control equipment parameters should be used to record data each hour, or more often if possible. Example logsheets for different types of control equipment are given in Tables 13A through 13C.

Some of the process instruments will be connected to automatic shutdown devices, and the permit writer/observer may request a demonstration of some of these automatic shutdowns as part of his observations during the trial burns. This needs to be arranged in advance and can usually best be done sometime shortly after a run is completed. Be aware that an unplanned activation on one or more of the automatic shutdowns may occur inadvertently during the testing.

TABLE 10. CHECKLIST FOR WASTE FEED RATE MONITORING SYSTEMS

Facility Name: ______________________________	Date completed or comment
Liquid feed	
• Is the primary measurement device downstream of any feed recycle piping takeoff (or are such recycle lines clearly blocked off)?	________
• Has the instrument recently been zeroed and spanned? (Examine records to verify this.)	________
• Has it been possible to conduct an actual calibration of the instrument recently? If so, examine calibration data and obtain copies. (This is usually difficult, since it would require revisions in the piping to direct the flow into a drum or other vessel and weighing the amount collected in the drum over a short time period. A good alternative is to cross-check the waste feed rate meter with the tank level change during each test as mentioned below.)	________
• What type of primary measurement device is used, and are measurement results a function of any waste feed characteristics (i.e., specific gravity, viscosity, temperature)?	________
• Will data be collected to cross-check waste feed rate based on tank level changes? (This is usually done and is quite important.)	________
• Does measurement readout agree closely with the value on strip chart recorder? Is the flow rate near that specified in the TBP?	________
Solid feed	
• If batch feed, has the scale been recently calibrated with check-weights?	________
• If batch feed, what is the approximate weight of each container and the frequency of feeding?	________ ________

(Continued)

TABLE 10 (Continued)

Facility Name: ______________________	Date completed or comment
• If continuous feed, has the weighing device recently been zeroed and spanned? (If so, examine records.)	________
• If continuous feed, has the weighing device recently been calibrated? (Difficult to do but should be feasible.)	________
• What does the device show as a reading when there is no material being fed (e.g., empty belt feeder)?	________
• Is there any way to obtain some gross check on waste feed rate, such as a change in level in a feed hopper?	________
• Can each feed source be weighed before and after each test (e.g., sludge fed from a tank truck)?	________

Comments: ______________________

NOTE: Many of the above items (e.g., calibration procedures) should have been specified beforehand in the TBP.

TABLE 11. RECORD OF PROCESS DATA INSTRUMENTS

Facility Name: ____________________

Name[a]	Instrument No. or ID	Units (e.g., °F)	Range (e.g., 0-150)	Pen color	Date of most recent calibration
1. Organic liquid feed rate					
2.					
3. Aqueous liquid feed rate					
4.					
5. Solids feed rate					
6.					
7. Atomizing fluid pressure					
8. Combustion gas velocity indicator					
9. Combustion chamber pressure					
10. Combustion chamber temperature					
11.					
12.					
13. CO conc					
14. O_2 conc					
15.					
16.					
17.					

NOTE: Identify those instruments which are tied into automatic shutdown systems and record alarm and shutdown settings.

[a] Numbers that are blank are provided for multiple feeds or other critical process instruments.

TABLE 12. PROCESS DATA LOGSHEET

Facility name ________________________ Date __________
Run No. __________
By __________

Parameter	Instrument No.	Expected value per TBP	Observed values ( )	( )	( )
1. Organic liquid feed rate					
2.					
3. Aqueous liquid feed rate					
4.					
5. Solids feed rate					
6.					
7. Atomizing fluid pressure					
8. Combustion gas velocity indicator					
9. Combustion chamber pressure					
10. Combustion chamber temperature					
11.					
12.					
13. CO conc					
14. O_2 conc					
15.					

TABLE 13A. EXAMPLE LOGSHEET FOR DRY SCRUBBER/BAGHOUSE/ESP

Facility name ______________________

Date __________
Run No. __________
By __________

Parameter	Instrument No.	Expected value per TBP	Observed values ( )	( )	( )
Dry scrubber					
Reagent feed rate	______	______	______	______	______
Atomizer speed	______	______	______	______	______
Nozzle pressure	______	______	______	______	______
Inlet temperature	______	______	______	______	______
Baghouse					
Pressure drop	______	______	______	______	______
Inlet temperature	______	______	______	______	______
Cleaning cycle	______	______	______	______	______
ESP					
Secondary voltage	______	______	______	______	______
Secondary amperage	______	______	______	______	______
Spark rate	______	______	______	______	______
Rapping rate	______	______	______	______	______

TABLE 13B. EXAMPLE LOGSHEET FOR VENTURI/PACKED TOWER

Facility name ______________________

Date ________
Run No. ________
By ________

Parameter	Instrument No.	Expected value per TBP	Observed values ( )	( )	( )
Venturi					
Pressure drop	______	______	______	______	______
Water flow rate	______	______	______	______	______
Effluent pH	______	______	______	______	______
Inlet temperature	______	______	______	______	______
Outlet temperature	______	______	______	______	______
Packed Tower					
Pressure drop	______	______	______	______	______
Water flow rate	______	______	______	______	______
Effluent pH	______	______	______	______	______
Inlet temperature	______	______	______	______	______

TABLE 13C. EXAMPLE LOGSHEET FOR IONIZING WET SCRUBBER

Facility name ______________________ Date ________
Run No. ________
By ________

Parameter	Instrument No.	Expected value per TBP	Observed values ( )	( )	( )
Inlet gas temperature					
Water flow rate					
Pressure drop					
Effluent pH					
<u>First stage</u>					
AC volts					
AC amps					
Spark rate					
DC volts					
DC MA					
<u>Second stage</u>					
AC volts					
AC amps					
Spark rate					
DC volts					
DC MA					

While observing the process operating conditions, the observer may need to consider some other criteria or items that may be specified in the permit, such as the following:

- Will data records be sufficient to determine variability in readings during the trial burn periods (i.e., how much did the parameter vary during the tests)?
- What permit conditions may need to be set (e.g., chart speed) to ensure adequate data records for enforcement during continued operation?
- Is there any reason to believe there might be a wider range in variability of parameter during normal operations after the trial burn?
- If a device is tied into the automatic shutdown system, what would be a reasonable value for activating shutdown (i.e., how much above or below the normal operating range)?
- Would a time delay period be reasonable before activating automatic shutdown to avoid frequent shutdown caused by very brief excursions in parameter (spikes)?
- What is a practical frequency at which the automatic waste feed cutoffs should be checked under continued operation if the applicant has requested to test these systems less often than on a biweekly basis?

Other important aspects of observing process operations are somewhat subjective. One of the observer's responsibilities will be to make note of any fugitive emissions (e.g., puffing from kiln seals). Other subjective aspects of the observation process are listed in Table 14. Any problems observed should be noted in the observer's logbook.

One other important aspect of observing process operations is the frequency that the desired operating parameters are outside the range of the desired test conditions and the number of shutdowns that may occur during test periods. These sometimes occur to the extent that the observer may feel the test data are compromised and the test should be repeated. A few of the guidance points that are contained in Table 4 may be helpful for problems of this type. However, they are usually site-specific and depend on judgments by the observer, considering the criteria listed earlier on page 13.

TABLE 14. GENERAL OBSERVATIONS OF PROCESS OPERATION

Facility Name: ______________________________

- Do operators seem to be well trained and experienced? ____________
- Are all personnel informed about the objectives of the trial burn and the TBP? ____________
- Do all personnel conduct themselves in a professional manner? ____________
- Is there a process operating logbook? Are entries legible and understandable? ____________
- Is equipment checked and inspected regularly? ____________
- Does equipment appear to be well maintained? ____________
- Are all lines and equipment clearly marked? ____________
- Are safety facilities and equipment available (e.g., safety showers, fire extinguishers, etc.)? ____________
- Are all leaks and/or spills cleaned up in a safe and expeditious manner? ____________

Comments: ______________________________

One of the most common problems facing the observer is process problems that delay startup of a test or a "temporary" shutdown in which sampling has been stopped. These temporary shutdowns seem to frequently consume several hours, and the observer may need to set a time limit after which the test is considered an "abort" and must be repeated. In this regard, one of the guidance points in Table 4 indicates that if sampling is stopped during a trial burn, the test may be completed using the same sampling trains, if the burn is completed on the same day it was started. However, in cases where several shorter duration shutdowns occur, the permit writer/observer might also determine the need to invalidate the run if he/she believes it is necessary based on the criteria on page 13. Some examples of such problems are included in the Appendix.

4.3 OBSERVATION OF FIELD SAMPLING/ANALYSIS ACTIVITIES

Observing actual field sampling is a critical part of the observer's responsibility, especially the stack sampling activities. The stack sampling activities are vital to assessing the performance results.

The observer should observe all the sampling activities, besides the stack sampling, on an intermittent or random basis. He/she should accompany the samplers as often as possible on all of their sampling rounds to verify that the samples are being taken in accordance with the test plan and sampling methods specified. He/she should ascertain that the sampling locations are appropriate and the procedures appropriate for obtaining representative samples. The observer should observe this sampling randomly during each test and use the checklist in Table 15 to help evaluate this sampling.

Observing stack sampling activities is critical because that is where sampling problems are most likely to occur. This activity usually involves simultaneous sampling by Orsat, CEMs, VOST, M5, and MM5. These methods are discussed in the following paragraphs.

Orsat is a bag sampling method used to collect samples for subsequent analysis by Orsat apparatus for O_2 and CO_2. One or more such bag samples may be collected over approximately the same period as the other sampling procedures. The observer should inspect this apparatus and the sampling line before the testing. During sampling, the observer should intermittently examine the apparatus to verify that sampling is occurring at a relatively constant rate, and the bag is not overfilling. After the test, the observer should observe the field analysis of a bag sample at least once.

CEM instruments are usually a part of the process instrumentation but they are sometimes provided and operated by the sampling contractor for verification. The observer's main interest here is to check that representative samples are reaching the instruments and that the system is being zeroed and spanned before and after each run (a common practice).

TABLE 15. GENERAL OBSERVATIONS FOR WASTE FEED AND WATER SAMPLING

Facility Name: ________________________________

- Is the sampling being done in accordance with the methods specified in the TBP and at the specified frequency? ________
- Are the samples taken in a manner that ensures their representativeness (e.g., lines purged before sampling; VOA vials are bubble free). ________
- Are the samples taken in a manner that minimizes chances of contamination? ________
- Are the samples stored properly (e.g., iced)? ________
- Are the samples stored in a manner that minimizes cross-contamination (e.g., high concentration feed samples separate from low concentration scrubber water samples)? ________
- Are log sheets filled out to show sampling times for each sample, sampler name, date, run number, etc.? ________
- Are samples properly labeled and labels protected from becoming illegible? ________
- Are traceability records being initiated and maintained for each sample? ________
- If samples are to be handled under chain-of-custody, are the proper procedures being followed? ________

Comments: ________________________________

In most cases, the CEM gas sample is withdrawn from the stack through a sample line to a remote CO (or O_2) instrument. A second, smaller line is commonly attached so that span gas can be injected near the stack location rather than at the instrument. This serves as a check against possible leaks in the sample line. Even so, the observer should request a leak check of the sample line and observe the calibration of the CEM instruments, as well as requesting a brief test to check the response time for the extractable CEM system.

The observer should also intermittently examine CEM instrument data readouts and data recording. He should note the average reading and the extent and frequency of spiking in the readings. In some cases, CO readings spike in concert with batch feeding of solids. The observer should be aware of guidance on CO limits, since revised regulations were being considered when this document was prepared.

VOST sampling is almost always the method used for quantifying emissions of volatile POHCs for calculation of their DRE (see Figure 1). This method involves changing trap pairs every 20 to 40 min, whichever may have been specified in the TBP. Leak checks must be performed before and after the sampling period for each pair. Therefore, the observer should be present to observe at least the final leak check on some or all pairs. The most recent VOST method (Method 0030 in SW-846) allows a leak rate of 2.5 mm Hg after 1 min.

The VOST method requires that the VOST traps be kept cool (with ice) and protected from contamination. This should be verified by the observer. Also, the fragile VOST traps may break from time to time. If a trap is broken when removed from the VOST apparatus, the sampling may have to be repeated to obtain the specified number of trap pairs in each run (three pair minimum, see Table 4). This, of course, extends the sampling time. It also means that one or more pairs may not be coincident with other sampling (e.g., MM5), but that should be acceptable as long as the process continues to operate in a stable manner. However, waste feed sampling and collection of operating data should also be extended to cover the entire sampling period for VOST, even if MM5 sampling has been completed earlier.

M5 and MM5 sampling methods are very similar, but the trains contain different impinger solutions, and the MM5 train includes a condenser and XAD resin cartridge. M5 is used to determine particulate and HCl emissions while MM5 is used to quantify semivolatile POHCs and their DRE. Figure 2 depicts an M5 train for determination of particulate and HCl emissions. The M5 train may also include impingers for collection of vaporous metals (see Reference 12 in Table 1B). Figure 3 depicts an MM5 train. The configuration shown in Figure 3 may be preferred, but optional configurations are also acceptable to EPA, as shown in Figures 4 and 5. Other configurations may also be acceptable, provided that there is no appreciable retention of liquid (condensate) upstream of the resin cartridge and that all the liquid flows vertically down through the resin during sampling. In any case, the train configuration, impinger solutions, and recovery procedures should have been specified in the trial burn plan, and the observer needs to verify that these procedures are being followed.

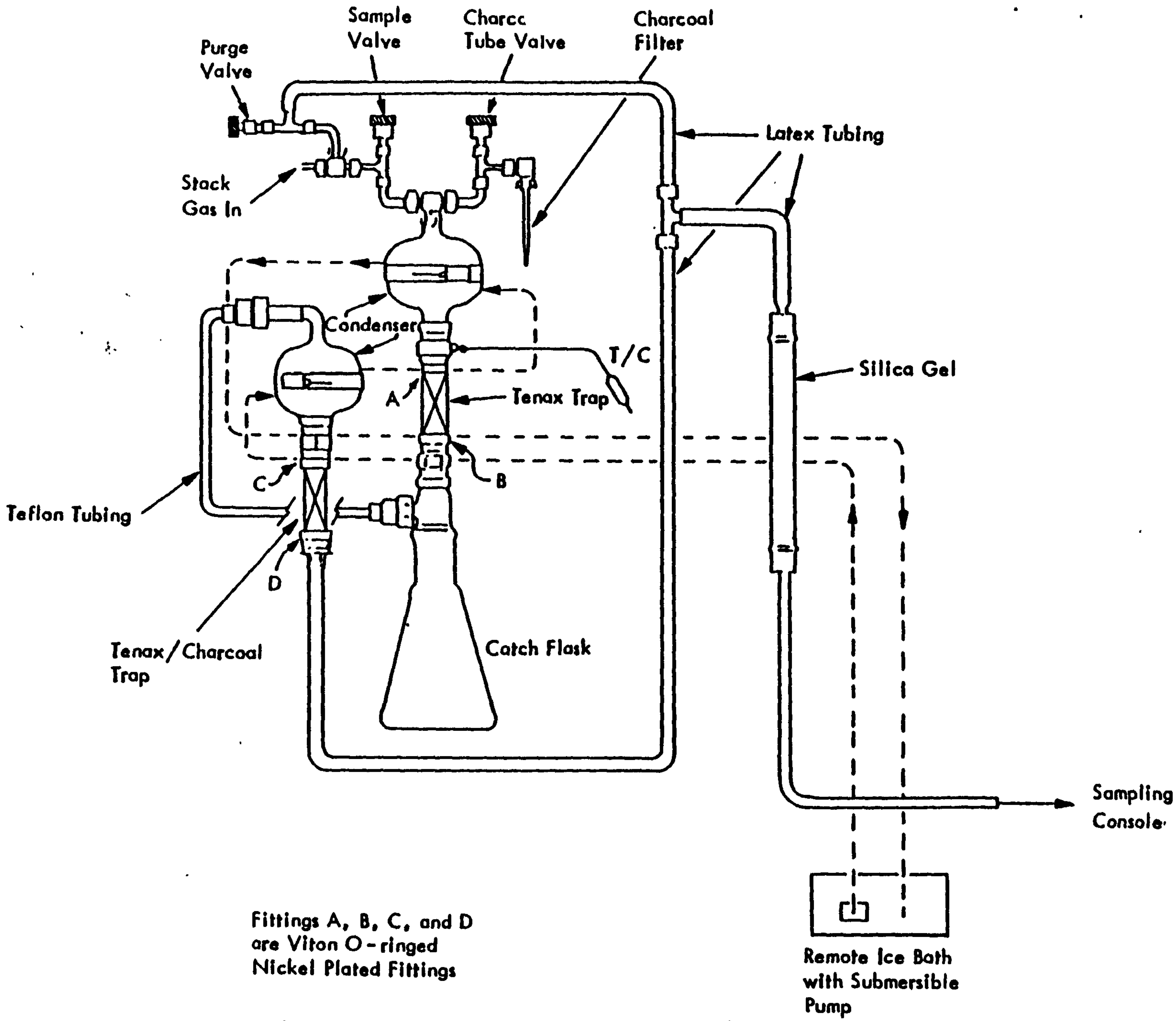
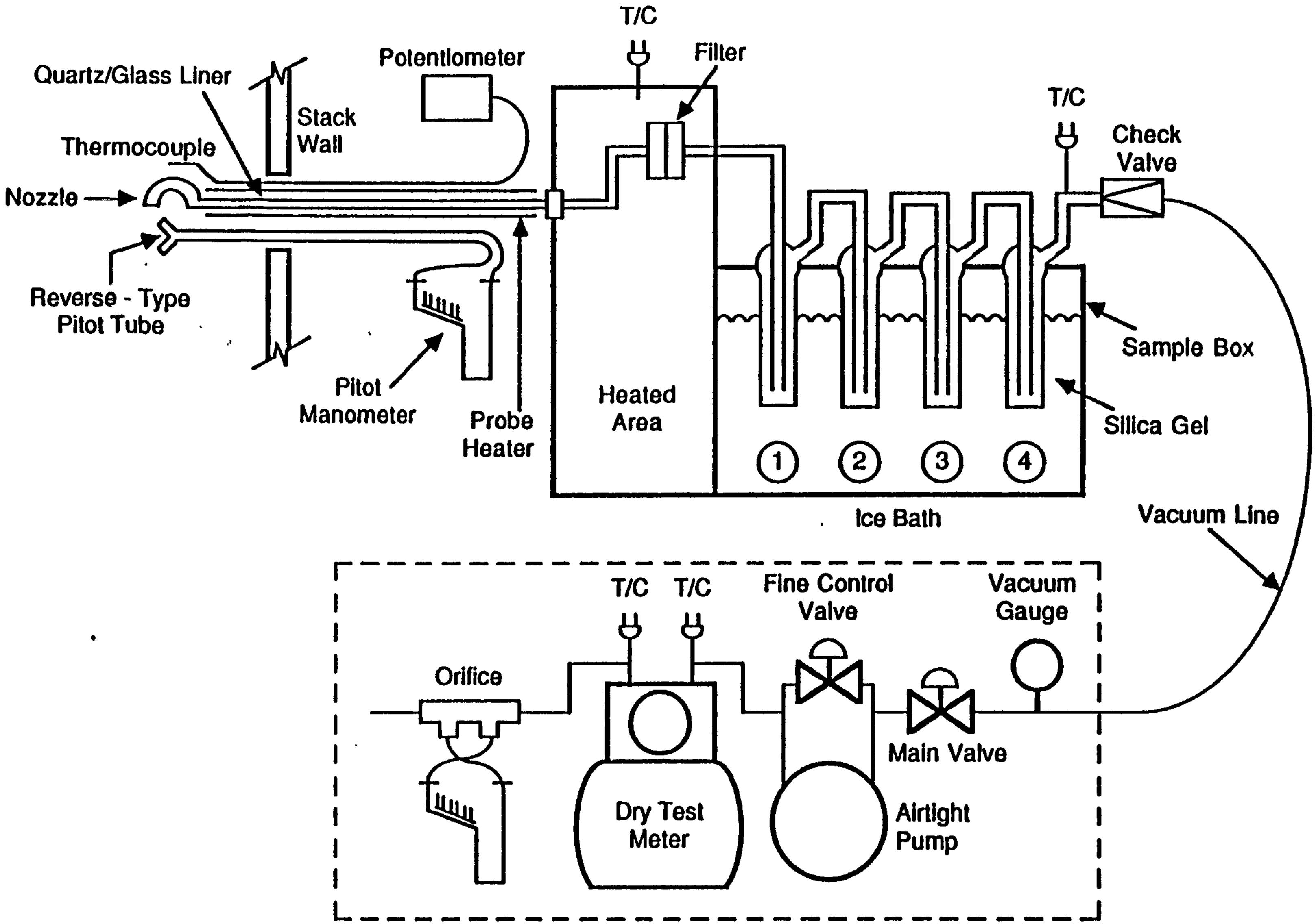
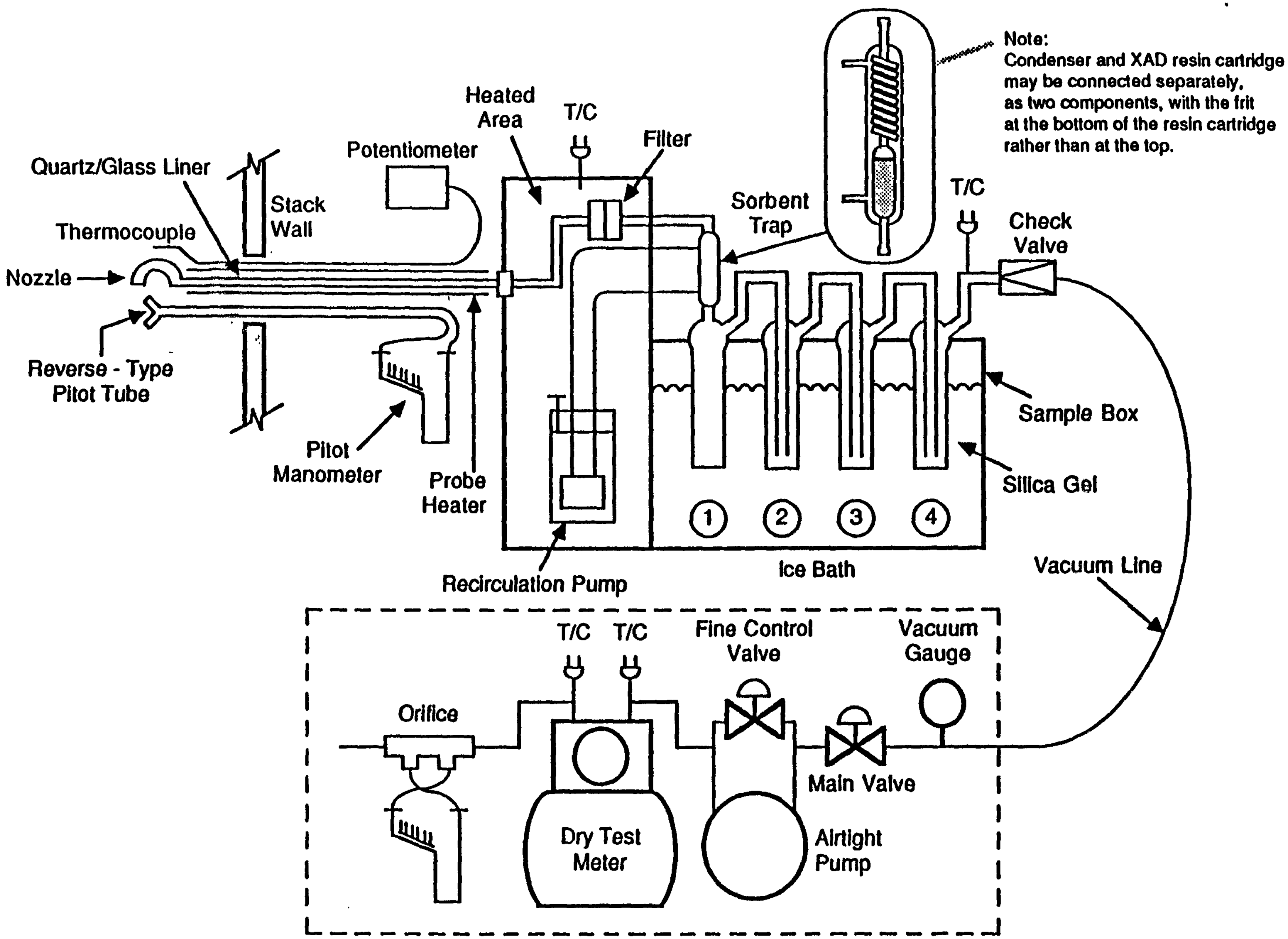


Figure 1. Volatile organic sampling train (VOST).



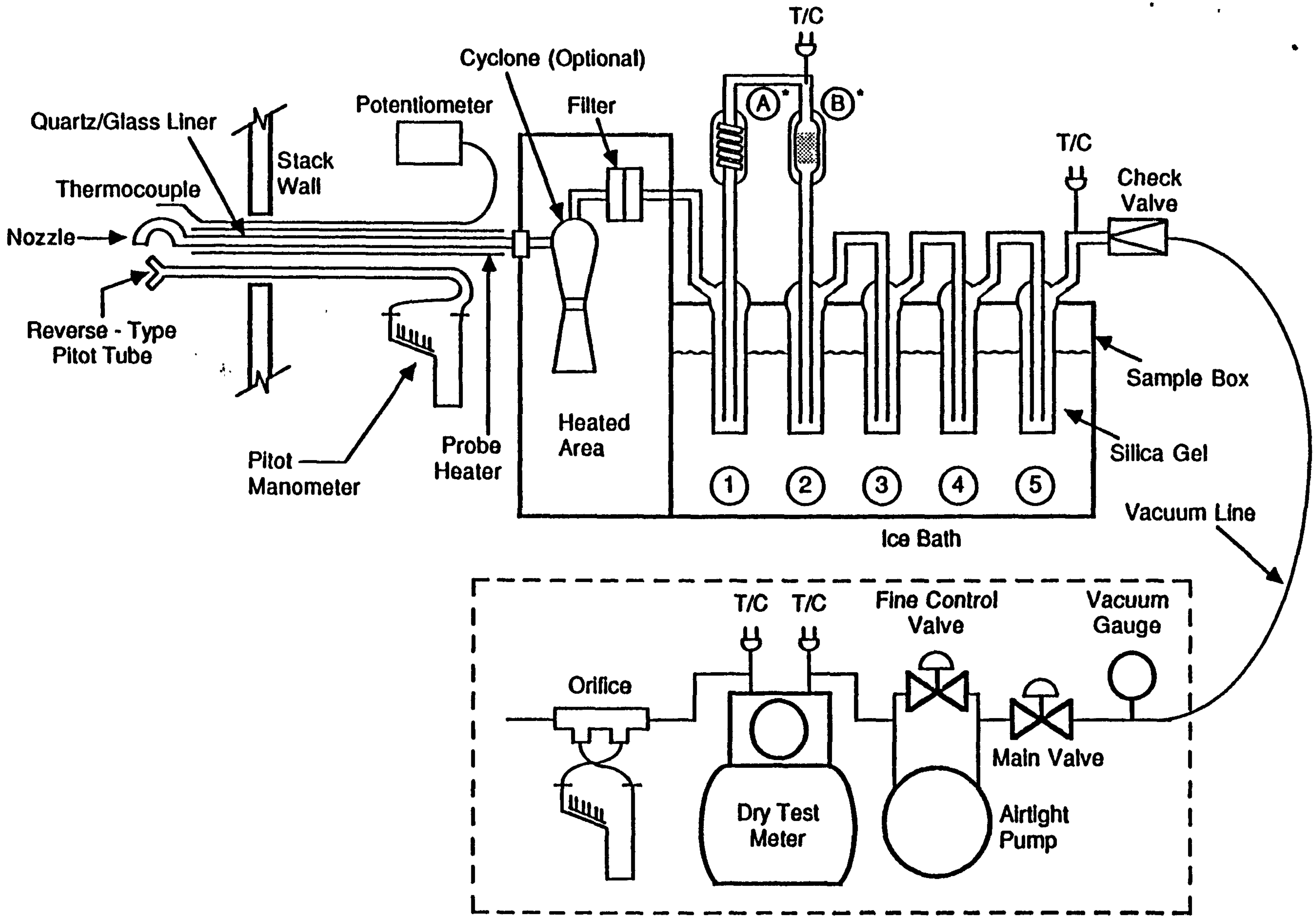
① Greenburg-Smith, 100mL Distilled H_2O
② Greenburg-Smith, 100mL 0.1N Caustic Solution
③ Modified Greenburg-Smith, Empty
④ Modified Greenburg-Smith, SiO_2

Figure 2. Method 5 particulate and HCl sampling train.



1. Modified Greenburg-Smith, 100mL of Double Distilled in glass H_2O
2. Greenburg-Smith, 100mL of Double Distilled in glass H_2O
3. Modified Greenburg-Smith, Empty
4. Modified Greenburg-Smith, SiO_2

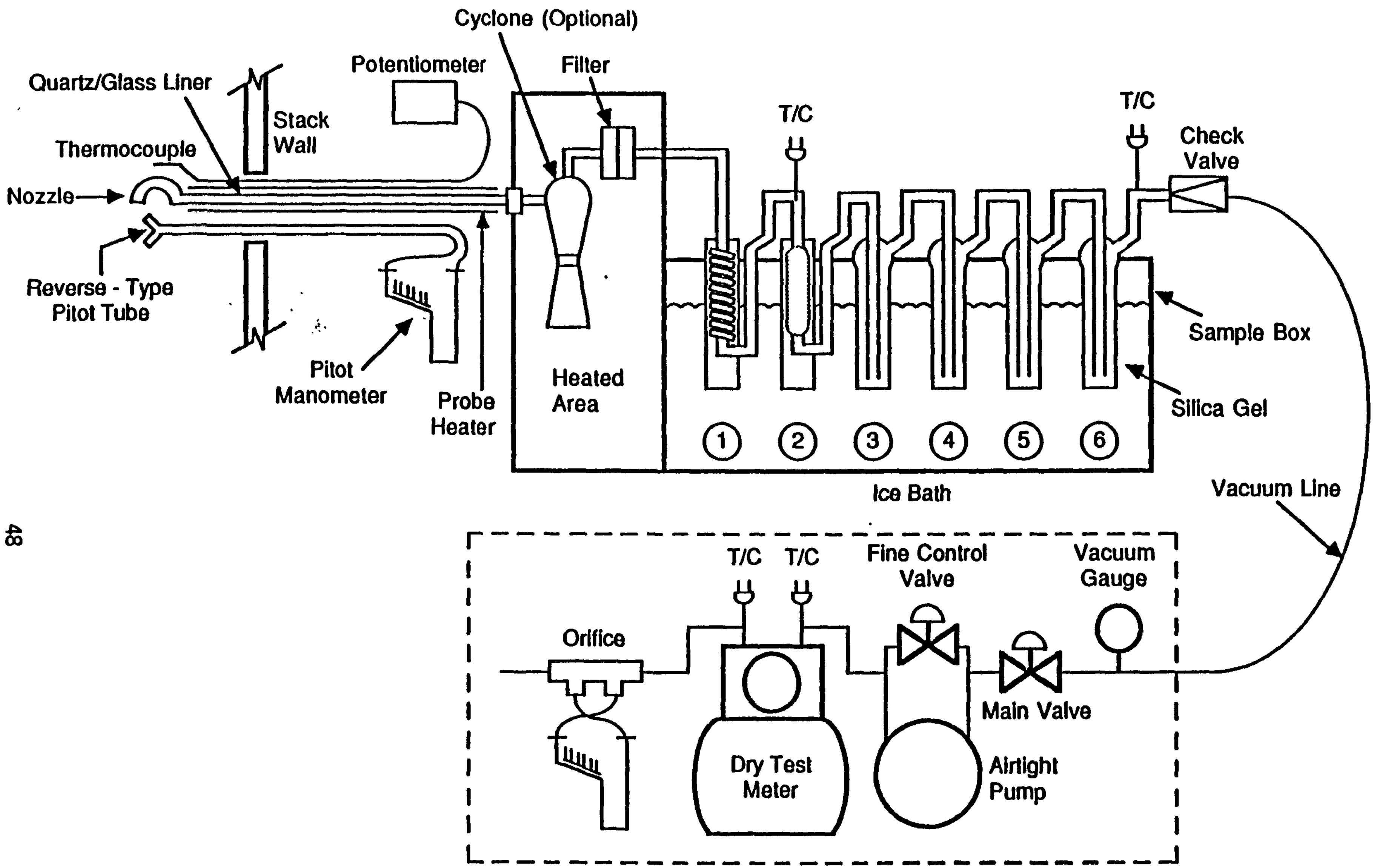
Figure 3. Modified Method 5 sampling train (MM5)--type 1.



① Modified Greenburg-Smith, Reversed, Empty
② Modified Greenburg-Smith, 100mL of Double Distilled in glass H_2O
③ Greenburg-Smith, 100mL of Double Distilled in glass H_2O
④ Modified Greenburg-Smith, Empty
⑤ Modified Greenburg-Smith, SiO_2

Ⓐ Condenser
Ⓑ XAD Resin Cartridge
* Ice Water Jacket

Figure 4. Modified Method 5 sampling train (MM5)--type 2.



① Condenser with Ice Water Jacket
② XAD Resin Cartridge with Ice Water Jacket, (65 g of XAD resin) — *See Fig. 5B*
③ Modified Greenburg-Smith, 100mL of Double Distilled in Glass H_2O
④ Greenburg-Smith, 100mL of Double Distilled in Glass H_2O
⑤ Modified Greenburg-Smith, Empty
⑥ Modified Greenburg-Smith, SiO_2

Figure 5A. Modified Method 5 sampling train (MM5)--type 3.

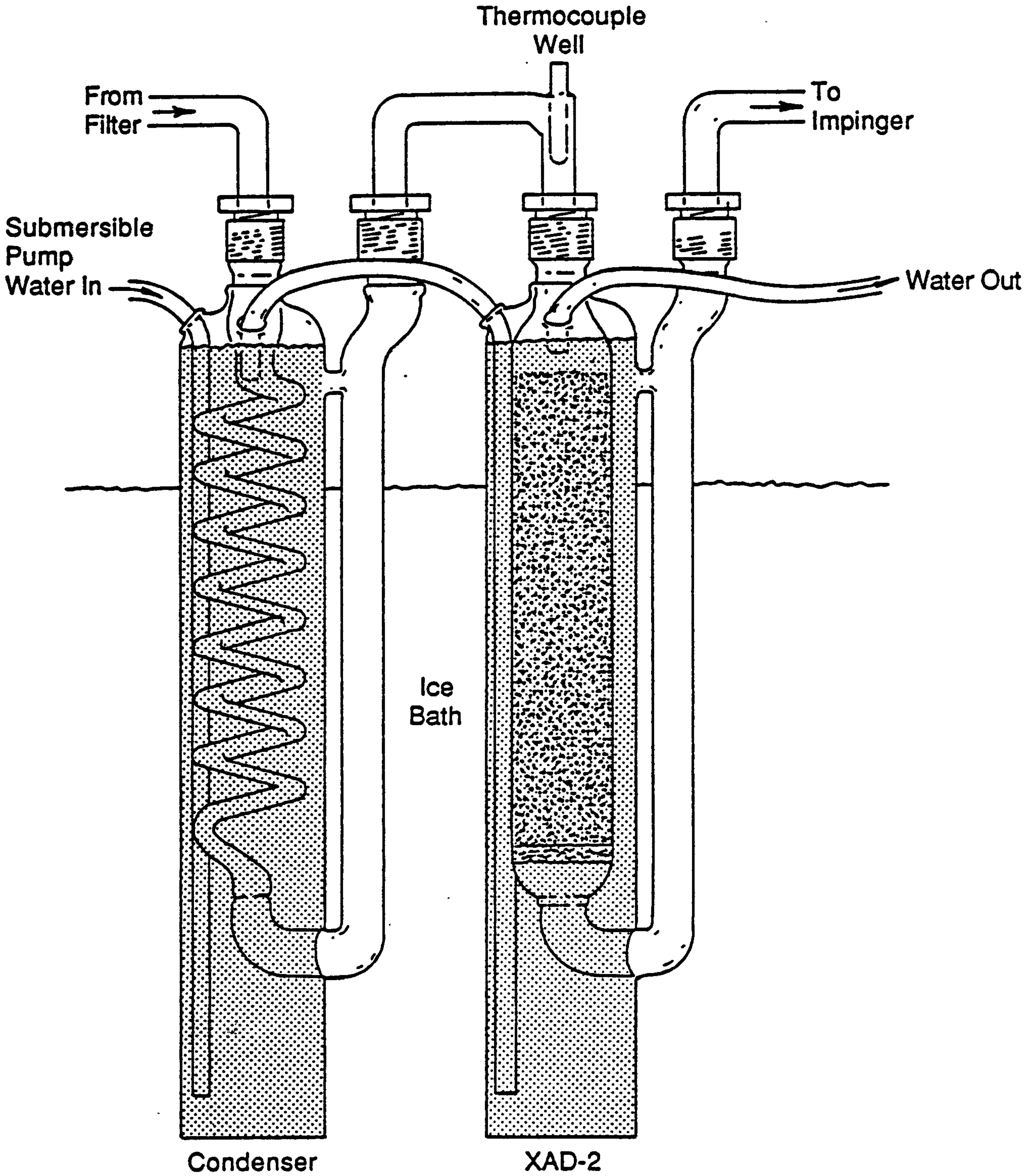


Figure 5B. Modified Method 5 sampling train (MM5)--type 3.

Checklists that can be used by the observer for the major stack sampling methods are given in Tables 16A through 16D. Observing the M5 and MM5 trains is a key function of the observer because of their importance and potential problems. First, the observer should watch the trains being prepared to ascertain that they are in accordance with the TBP and method specified. (Only Teflon and glass are permitted to be used in the MM5 train; no grease is allowed for sealing ball joints, etc., except after the silica gel impinger.)

Observers usually prefer to watch the M5 and MM5 sampling throughout much of the trial burn's duration, especially the port changes and leak checks (see Table 16C). Leak checks are performed initially, before and after each port change, and at the end of the sampling period. A final leak check is also required on pitot tubes used in the trains. The allowable leak rate on M5 and MM5 trains is usually 0.02 cf in 1 min (see EPA Method 5 for details). Slightly higher leak rates sometimes are acceptable, if the corrected sample volumes do not cause the isokinetic sampling value to exceed 100% ± 10% (see Section 6.3 of EPA Method 5 for details). If any of the leak checks are unacceptably high, the sample will be invalid requiring another train to be brought up to the stack and sampling restarted. This, however, means that sampling times for the run may be extended significantly. More importantly, it means that the sampling will not be coincident with other sampling (e.g., VOST) and that waste feed sampling, etc., must be extended, or an additional set of all samples taken to cover the new sampling period for the MM5 train. It is therefore helpful if a course of action or contingency plan is developed beforehand to cover such situations (see Note).

Another important part of the MM5 sampling is the sample recovery procedures. The observer should observe the probe rinsing operation to be sure it is done in accordance with the specified method using the specified rinse solutions. He/she should also observe recovery of the filter/impinger samples, which is a tedious and lengthy process. It is this recovery that probably represents the highest potential for contamination of samples. Some of the points to be observed in MM5 recovery are listed in Table 16D.

Note:

It is desirable for all sampling to be coincident, but may not be a necessity if the process operates stably, within the trial burn test conditions, throughout the entire test period. In fact, some tests have been done with sequential sampling due to limitations in the sampling ports or other reasons. Variations may also occur in specific situations (e.g., failure of leak check at port change).

TABLE 16A. ORSAT SAMPLING CHECKLIST

Facility Name: ______________________________

1.	Was the bag leak-checked before use?	________
2.	Was the sample line leak-checked and purged before start of sampling?	________
3.	Was sampling continuous over the duration of most of the MM5 sampling?	________
4.	Was sampling done at a reasonably constant rate?	________
5.	Were the bag samples analyzed within 4 hr after sampling?	________
6.	Was the absorbing solution checked (e.g., O_2 analysis of ambient air)?	________

Comments: ______________________________

TABLE 16B. VOST SAMPLING CHECKLIST

Facility Name: ______________________________

1. Were the traps kept cool before, during, and after sampling (< 20°C)? __________

2. Was each trap pair leak checked before and after sampling? __________

3. Was a glass or Teflon heated line used for sampling? __________

4. Was the sample line leak-checked and purged before the start of sampling? __________

5. Were the required number of trap pairs taken? __________

6. Were the specified blank traps taken? __________

7. Was sampling data logged for each trap pair? __________

8. Was proper sample volume taken in each trap pair (20 L)? __________

9. How is each trap pair identified (e.g., sample number)? __________

Comments: ______________________________

TABLE 16C. M5/MM5 SAMPLING CHECKLIST

Facility Name: ______________________________

1.	Was the sampling train properly prepared (Teflon/glass and no grease used)?	________
2.	Was the manometer system (console) leveled and zeroed before sampling?	________
3.	Is the probe properly marked for each sampling point? (see EPA Method 1)	________
4.	Was a check made for cyclonic flow in the stack? (see EPA Method 1)	________
5.	Is the probe and sample box maintained at proper temperature (250° ± 25°F)?	________
6.	Were there any problems with high vacuum in the train (e.g., 15-20 in. Hg) which made it difficult to maintain the required isokinetic sampling rate?	________
7.	Were sampling rate changes (adjustments) made in a timely manner?	________
8.	Was proper temperature maintained at the inlet to XAD resin (< 20°C)?	________
9.	Was the train leak checked before and after each port change and a final leak check made? (Allowable leak rate is 0.02 cfm or 4% of the average sampling rate, whichever is less.)	________
10.	Were the sampling ports adequately plugged during sampling?	________
11.	Was stack static pressure properly measured?	________
12.	Were the pitot tubes leak checked?	________
13.	Was the total sampling time, and time at each point, the same as that specified in the TBP?	________

(Continued)

TABLE 16C (Continued)

14. Were the nozzle and other openings covered with foil as appropriate to protect from contamination?	______
15. Were data sheets filled in completely during sampling?	______

Comments: ____

TABLE 16D. M5/MM5 RECOVERY CHECKLIST

Facility Name: ____________________

1. Was the probe properly rinsed and brushed, with specified reagents, while protecting the sample from contamination? ______

2. Were the train components disassembled to protect against loss of sample and done in a clean area to minimize contamination? ______

3. Was the filter carefully handled to prevent loss of particulate? ______

4. Was there any evidence that particulate may have been bypassing the filter? ______

5. Could the filter be recovered without tearing and without pieces adhering to surfaces that might affect filter weight? ______

6. Were all components properly rinsed and samples recovered in accordance with specified method? ______

7. Were impinger volumes measured or weighed properly (±1 g or mL) and recorded on data sheets? ______

8. Were joints sealed or covered with foil after sample recovery in preparation for next test? ______

9. Was a blank train assembled and recovered using the same procedures as actual sample trains? (A blank MM5 train need only be done once for each set of 3 runs)? ______

10. Were other blank samples taken (e.g., reagents, filter, XAD)? ______

11. Were all MM5 samples properly labeled and stored on ice after recovery? ______

Comments: ____________________

The period after completion of actual sampling is one of the busiest times of trial burn activity. Besides MM5 train recovery, all other samples must be secured and stored properly, and all associated data sheets must be completed along with all sample traceability records. Orsat bags must be analyzed. Also, stack sampling data sheets must be compiled and calculations made to check the isokinetic sampling rate sometime before the start of the next run. This work is crucial to the validity of results; therefore, it is important that the observer remain on site after the sampling period.

The end of the sampling period for each run is also a time when everyone is usually tired and mistakes are most likely to occur. This is an excellent time to observe the attitudes and competency of those involved.

There is one final point to be made, for the permit writer/observer. Try to avoid touching any of the instruments and under no circumstances make any adjustments in the instruments or valves, etc. Further, do not assist in any of the sampling or handling of any sampling equipment. There is sometimes the inclination to help someone who is struggling with lifting or moving a piece of sampling equipment (e.g., an MM5 sample box). That temptation must be resisted, in order to avoid contributing in some way to an operating problem or damage to sampling equipment.

4.4 PERSONAL SAFETY OF THE OBSERVER

The permit writer/observer should bring proper work clothing including coats, gloves, and rain gear and have certain safety equipment on site (hard hat, safety glasses, safety shoes). He should also determine beforehand if the plant has any other safety requirements (e.g., no beard, long sleeve shirts). The observer should also allow time for the plant's safety orientation, which is commonly required. However, do not sign any injury waiver forms or secrecy agreements, as required at most plants. Some of these waivers might bind the observer not to reveal anything seen or learned on site. Your refusal to sign must be worked out before arrival, as noted earlier in Table 6, and may still involve some difficulty or delay in gaining access when you arrive. Therefore, you should call in advance to be sure about any "special" arrangements for your entry. Assistance can be obtained from your Office of Regional Counsel or corresponding State office.

All the safety equipment is useful and should be worn at all times, but reasonable caution and good sense are most important. Stack sampling observation is not an inherently safe activity, and no action should be taken if the observer believes it to be unsafe, even if others are doing it. If an unsafe situation arises and it prevents the observer from performing his duties, he/she should inform someone that the results will not be accepted as valid unless the observations can be performed in a safe manner. An individual should not attempt to be an observer if he/she has a fear of heights or is not in reasonably good physical condition.

EPA personnel who are observers must be aware of the fact that it is EPA policy to comply with OSHA regulations. These regulations prescribe 40 hours of health and safety training plus a baseline physical examination and annual examinations thereafter. Observer's training and the baseline physical examination must be completed before field activities are allowed.

4.5 QA/QC AUDITS

One of the first sections of this document that pertained to preparation for observing a trial burn briefly described arranging for field audits and/or check samples. Arranging for this auditing activity might be done by the permit writer/observer or by other regulatory agencies or even by the applicant himself. In any case, the observer should be aware that this auditing activity may be taking place during the trial burn. If the observer decides such auditing is necessary, it is important that this be arranged well in advance with a clear plan defining the auditing and the acceptable results criteria, and what course of action will be taken if results are not within acceptable range.

There are two types of audits--systems audits and performance audits. The observer, himself, is actually performing a systems audit, in that he tries to ascertain that the work is being performed in accordance with methods specified in the TBP and QAPP. A performance audit, on the other hand, actually checks the performance or accuracy of measurements being made. In most trial burn audits, this involves the following:

- Gas cylinders containing known concentrations that check results of CEM instruments and Orsat analysis
- NBS traceable thermometers and barometers to check temperatures and barometric pressure readings, etc.
- Calibrated orifices to check accuracy of dry gas meters used in MM5 apparatus

The performance audits may also include the preparation of known solutions of analytes to be submitted for analysis along with actual samples to check the accuracy/precision of analytical results.

4.6 MAJOR DEVIATIONS OR PROBLEMS

Several of the deviations or problems that may occur while observing trial burns have been mentioned in other sections of this guidance document. As noted, they can usually be worked out satisfactorily so as not to jeopardize the results or seriously impair the permit writer's requirements for setting permit operating conditions. Even so, there are some deviations or problems that could do so.

It could be considered a "problem" if something occurred that required a run to be repeated. However, the plant personnel and the samplers are usually aware of this possibility and can take it in stride. In fact, the samplers are usually the first to identify a problem and will notify everyone that a repeat is needed. However, much more serious problems can occur, some of which are listed below:

- The plant cannot complete the required number of runs due to insufficient waste or equipment failure.

- Fugitive emissions are excessive or operating practices unacceptable.

- On-site observations reveal that trial burn operating conditions and subsequent operating limits cannot be maintained during certain phases of plant operation (e.g., auxiliary fuel system used for heat-up cannot attain minimum operating temperature required before introduction of waste).

- An instrument that must be operable during the trial burn in order to set operating limits malfunctions before or during test and cannot be repaired for some time (e.g., CO monitor, waste feed flowmeter).

- CO levels exceed applicable limits.

Other situations may occur as part of a trial burn that would seriously jeopardize the results or data needs, and some will likely not be a clear-cut situation. Thus the guidance offered earlier still applies. That is, prepare for this possibility by having names and phone numbers (office and home) readily available for those you might need to consult with and those who have supervisory responsibility and should be involved in the decision-making. As noted earlier, some of the problems that have occurred during trial burns and their resolution are listed in the Appendix. However, they are site-specific and are presented here only as examples.

4.7 DOCUMENTATION OF ACTIVITIES

Throughout all of the activities, the permit writer will need to keep comprehensive notes in a bound notebook. The observer should record the date on each page and time of each entry, but also the run number, using the same numbering system as the sampling crew. Note all those items observed that are satisfactory, as well as those that are not. One of the important areas to keep notes on is the general operating parameters of each test and the time and cause of any upset condition.

It is expected that the permit writer/observer will immediately inform those in charge if he/she feels some procedural problem or change compromises the results or seriously impairs his/her ability to prepare the operating permit. The observer has a responsibility to let the permit applicant know of any serious problems at the time they are observed; not later. Presumably, any such problem will be corrected or worked out on site. However, if the permit writer/observer noted something and did not consider it a problem at the time, but later discovered that it was a major problem, it would not be necessary to accept the test as valid. That is, the permit writer should not accept bad data under any circumstances.

Quite often there are a number of minor problems or procedures that the observer believes are not serious problems but could have been improved upon. Therefore, after the trial burn is completed, the observer may review his logbook and let those involved know what he felt might have been done better and, of course, to let them know what was done well. This is generally a courtesy, but not a requirement.

For further documentation of activities, the observer may also want to obtain copies of critical sampling data sheets or process data sheets and strip charts before leaving the site. If it is feasible (i.e., copy machine available), the observer may request copies be made of MM5 data sheets, VOST data sheets, process operating log sheets, and selected strip charts (temperature, feed rate, CO monitor). Be sure these are clearly identifiable and readable, especially copies of strip charts.

The observer may also want to date and sign some of the continuously recorded data (strip charts) and data sheets. If this is done, then some selectivity should be established because it may be difficult to sign all the data sheets generated during a trial burn. It is best to make a checklist of all the data sheets and strip charts selected to be signed. This checklist can be given to the appropriate test site personnel so that they are aware of what is to be signed. The permit writer/observer should also use the checklist to ensure that he/she has signed all the selected data sheets after each run and checked that they were properly labeled and completed.

SECTION 5.0

OBSERVATION REPORTS

After the trial burn is completed and the observer has returned to his/her office, it is advisable to prepare an Observation Report that summarizes the events and observations. Such reports may contain the following sections:

- Demonstration test schedule and activities (i.e., log of events)
- Process operation observations
- Sampling activity observations
  - Process samples
  - Stack samples

The first section, dealing with the demonstration test, needs to contain a table with a brief statement of activities, by date, for each day on site. It should also indicate the run (run number) conducted on specific days and the types of waste feed and test conditions for each run. It should also note any important problems or aborted runs. The section itself should summarize on-site activities, noting certain problems and solutions and a general overview of the conduct of the trial burn.

The second section deals with process operation observations and should summarize operations, problems, or fugitive emissions. General conditions of the plant and procedures should be noted.

The third section of the report summarizes observations regarding the process and stack sampling. Deviations from procedures stipulated in the TBP and sampling methods referenced therein should be listed, along with general comments about the sampling and the personnel performing those activities.

Other sections of the report may address safety considerations and any performance audit results or check samples taken, if applicable. Appendices may be attached to the report comprised of the completed tables and checklists presented earlier in this guide.

APPENDIX

ACTUAL PROBLEMS THAT HAVE BEEN ENCOUNTERED DURING TRIAL BURNS AND THEIR RESOLUTIONS

Some problems in the hazardous waste incinerator process operation and monitoring/sampling activities commonly occur during trial burns. This appendix presents summaries of actual problems encountered during trial burns and their resolution. In each case, the trial burn observer had to make a decision on-site to resolve the problem.

This Appendix is presented to give examples of some problems which may be encountered in trial burns, but is not intended as a guide to resolving them. Each problem must be resolved on a case-by-case basis by the trial burn observer as the need arises and circumstances dictate.

A. Deviations from the Trial Burn Plan

It is common for the applicant to request one or more deviations from the approved trial burn plan at the on-site pretest meeting. Deviations often requested include changes in the incinerator operating conditions, such as temperature, waste feed rate, concentration of the hazardous substance(s) in the feed, and combustion gas velocity; changes in locations or methods of taking process or stack gas samples; schedule changes; and changes in the automatic waste feed cutoff system operating parameters. Important aspects to be considered before approving any requested changes, especially major changes for a new facility, were discussed in Section 3.1. Changes or deviations often require consultation with others, especially for a new facility or when the change should have been resolved during development of the trial burn plan.

Field circumstances usually cause most of the changes or deviations to be requested. Some actual deviations to trial burn plans requested by applicants and the response of the trial burn observer are presented below:

A1. Deviation requested: Raise the secondary combustor temperature from 1600° to 1750°F.

Response: The higher operating temperature was allowed with the specification that the permitted operating temperature would be based on 1750°F, not 1600°F.

A2. Deviation requested: Lower the waste feed rate from 4.3 tons/hr to 3.5 tons/hr.

Response: The lower waste feed rate was allowed with the specification that the permitted waste feed rate would be based on a maximum of 3.5 tons/hr, not 4.3 tons/hr.

A3. Deviation requested: Change location of liquid waste feed sampling from tap in the feed line to a tap in the agitated storage tank.

Response: The request was denied since it was uncertain that the waste feed mixture was homogeneous and only part of the contents of the tank would be used in a single test run. Sampling the tank may not have been representative of the actual waste fed during each individual test run. Therefore, the applicant was required to sample from the feed line.

A4. Deviation requested: Change waste feed sampling interval from 15 to 30 minutes for the composite waste feed sample.

Response: The request was denied and waste feed sampling was conducted at 15-minute intervals. The trial burn observer deemed that a less representative sample would result if the longer sampling interval were allowed.

A5. Deviation requested: Change impinger solution in MM5 train for sampling metal emissions (lead and cadmium) in stack gas from silver-catalyzed ammonium persulfate solution to nitric acid solution. Reason given was the persulfate solution is difficult to analyze for metals.

Response: The trial burn observer was uncertain as to the effect of this change on the sampling method, and consulted staff in his home office, a contractor laboratory, and staff in Research Triangle Park, North Carolina. After considering various opinions, the observer decided that both solutions should be put in separate impingers in the MM5 train, and both solutions should be analyzed for metals after sampling. The applicant complied with that decision. (It must be noted that the need for this type of change should have been recognized and resolved during development of the TBP.)

A6. Deviation requested: Change simultaneous sampling of stack gas with M5 and MM5 trains to sequential sampling (M5 followed by MM5) due to accessibility problems on the stack.

Response: The change was denied since the accessibility problem could be readily remedied, and simultaneous sampling is preferable over sequential sampling.

A7. Deviation requested: Change schedule from one trial burn run per day to two runs per day.

Response: The schedule change was allowed with the provision that the second test would not extend the day's work schedule beyond 12 hr/day. This limit was set to prevent excessive fatigue of the sampling team, which could cause accidents or possibly affect performance of the sampling team during the second run.

A8. Deviation requested: During assembly of the MM5 train, prior to the first run, the observer noted that the glass tubing to the condenser/XAD was connected with a short piece of rubber tubing. The observer informed the test crew that this was a deviation from the method, which specified only glass or Teflon. Since only a very short piece of tubing was involved, the test crew requested that this deviation be allowed.

Response: After conferring with EPA experts by phone, the deviation was not allowed. The test crew was able to replace the rubber tubing using Teflon tubing and Teflon tape.

B. Process Problems

Problems can occur in the incinerator operation during the trial burn which must be resolved by the applicant and trial burn observer. Some actual problems which have occurred in the past and their resolution are presented below.

B1. Problem: The solid waste feed system clogged during the middle of a test run and required 1 hr to correct, while the incinerator continued operation.

Resolution: The trial burn observer stopped the stack gas sampling shortly after the clog occurred. Sampling was resumed using the same sampling trains 30 minutes after solid waste feed had been resumed. The samples collected in the trains were deemed to be valid.

B2. Problem: Water flow to the venturi scrubber decreased during a test run and required about 1.5 hr to correct, while the incinerator continued to operate without waste feed (the automatic waste feed system cutoff was activated).

Resolution: The trial burn observer stopped stack gas sampling when the waste feed was cut off, and sampling was resumed with the same sampling trains about 20 minutes after the waste feed system had been reactivated. The samples collected in the trains were deemed valid.

B3. Problem: Temperature in the secondary combustor rose too high twice during a 1-hr period of a trial burn run, and activated the automatic waste feed cutoff system (high temperature cutoff). The temperature was lowered both times and the run continued.

Resolution: Stack gas sampling was stopped after the first incident, restarted, and stopped again after the second incident. Once the temperature stabilized the second time, sampling was again resumed. The test run and samples were deemed valid by the trial burn observer since sampling was interrupted for only about 1 hr.

B4. Problem: The activator controlling the damper in the ID fan system failed due to excessive vibration.

Resolution: The system was shut down until a new activator was installed. The test was cancelled and was run the next day.

B5. Problem: During a test run, the venturi damper broke and the system was shut down.

Resolution: Stack sampling time had been under way for only 45 minutes when the damper broke, and the trial burn observer aborted the test. The damper was replaced overnight, and the test run was conducted the next day.

B6. Problem: The scrubber system ran out of caustic solution near the end of a test run and the system was shut down. The problem developed because 6 hr of incinerator operation was required to maintain steady state before the run began, and the caustic supply was to be replenished that night.

Resolution: Stack sampling had been conducted for 3 of the 4 hr scheduled. The trial burn observer determined that sufficient sampling time for all samples had been completed, and the test was considered to be valid.

B7.* Problem: Fugitive emissions of bottom ash, conveyed from the incinerator and dumped into trucks, were excessive at the outset of the first two test runs. The process used water to wet the ash for control of emissions. However, the water was turned on manually, and the operator failed to start water flow until several minutes after ash dumping had begun.

Resolution: The trial burn observer specified that the procedures be changed to ensure that water flow begin before the ash conveyor started to prevent further fugitive emissions of ash. The applicant agreed and also indicated that the system would be automated following the trial burn.

B8.* Problem: Bottom ash fines were dumped into a covered 55-gal drum through a rigid pipe. Air emissions of the fines were observed during the trial burn.

Resolution: The trial burn observer requested that the condition be corrected. The applicant replaced the rigid pipe with a flexible boot which solved the problem.

B9.* Problem: Trucks receiving bottom ash were parked on undiked concrete pads. Ash and spray water spilled onto the concrete on several occasions and were not initially cleaned up.

Resolution: The trial burn observer noted the spills and requested that they be cleaned up in accordance with the spill prevention and control plan since the concentrations of hazardous constituents in the ash were unknown. The applicant complied. In addition, plastic sheets were placed on the concrete and the area around the trucks was diked with sorbent material to control future spills, at the request of the observer. The applicant agreed to follow this procedure in the future and make it a part of the process operation plan.

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* Note regarding examples B7, B8, and B9: If the observer is not the permit writer, he or she may not have direct responsibility for resolving these types of problems, which are not related to validity of test results. In such cases, or where longer term corrective measures are required, the issue should be noted and reported to both the applicant and the appropriate regulatory office.

B10. <u>Problem</u>: The incineration system experienced numerous operational difficulties on the first test day, and no tests were run. The second day, operational difficulties caused the test to be aborted during the run.

<u>Resolution</u>: The trial burn observer met with the applicant at the end of the second day to assess the feasibility of continuing the trial burn. By mutual agreement, the trial burn was postponed until a later date.

B11. <u>Problem</u>: Plant operating problems continued to delay the start of the run.

<u>Resolution</u>: The observers conferred and determined a time when the test would have to start in order to finish by 10:00 p.m. Plant personnel were informed of this necessary start time. The run did not start by that time and was postponed to the next day.

B12. <u>Problem</u>: Liquid waste feed flowmeter was malfunctioning, producing erratic readings, prior to the start of the run.

<u>Resolution</u>: The run was carried out, using the tank level change to determine waste feed rate during the run. However, it was stipulated that the flowmeter needed to be repaired and operational for subsequent runs.

C. Monitoring/Sampling Problems

Problems can occur with monitoring and sampling activities which must be resolved by the applicant and trial burn observer. Some actual problems which have occurred in the past and their resolution are presented below.

C1. Problem: An audit of the automatic waste feed cutoff system revealed that the system did not function properly for low temperature in the secondary combustion chamber.

Resolution: The condition was corrected and passed a second audit prior to the trial burn.

C2. Problem: The continuous emission monitors for CO and O_2 were audited using an audit gas cylinder. The CO monitor failed the audit twice.

Resolution: The trial burn was cancelled after it was determined that replacement of the monitor would take several days. A new date was set for the trial burn, with the stipulation that the CO monitor pass an audit prior to that date.

C3. Problem: During the middle of a test run, erratic temperature readings for the rotary kiln were experienced.

Resolution: The trial burn observer requested that the waste feed and all sampling activities be stopped until the condition was corrected. The thermocouple was replaced and normal readings were obtained. The procedure took about 2 hr, and the test run was allowed to continue to completion.

C4. Problem: All three sampling consoles were audited with a critical orifice to check the dry test meter accuracy. One of the consoles failed the audit.

Resolution: Another console was audited and passed, and was used to replace the failed console prior to the trial burn.

C5. Problem: The M5 and MM5 sampling trains for the stack gases were set up by placing the probes in the stack and the impinger boxes on the ground, and connecting the probes and boxes with unheated 30-ft Teflon tubes. This procedure had not been specified in the trial burn plan.

Resolution: The trial burn observer indicated that this setup was a major deviation from the reference methods, and was not acceptable. The sampling team placed the impinger boxes on the stack platform, but still used unheated Teflon tubes (about 10 ft each) due to limited access to the stack ports (the reason for the tubes in the first place). While this change improved the situation, the observer warned the sampling team that this procedure might still be unacceptable, and he needed to consult other staff on the matter. The first test was run that day anyway.

After consultation the next day with the home office, other EPA experts, and a contractor, the observer concluded that the tubes were acceptable only if they were heated. The first run, therefore, was deemed invalid.

C6. Problem: M5 and MM5 trains were used in the trial burn runs to simultaneously sample the stack gases. During one run, the M5 train failed the leak check after the first traverse.

Resolution: The M5 train sample was invalidated because the leak check failed. The observer allowed the MM5 train sampling to continue while a second M5 train was prepared for sampling. The second M5 train began sampling after about two-thirds of the MM5 train sampling had been completed. The M5 train sampling was completed about 1 hr after completion of MM5 sampling. Both samples were considered to be valid, even though they were not taken simultaneously as specified in the trial burn plan, because the incinerator was run at the same operating conditions throughout the entire sampling period.

C7. Problem: The M5 train passed the leak check after the first traverse, but failed the leak check before the second traverse of a trial burn run. It was determined that the glass probe liner had been broken while changing ports.

Resolution: The broken probe liner was replaced and the test continued. The samples in both probes were recovered and added together for analysis.

C8. Problem: During recovery of the M5 and MM5 trains at the end of the first test run, the sample from the M5 particulate train was lost when a flask broke. The MM5 train was recovered successfully.

Resolution: The trial burn observer had to decide whether to (a) invalidate the first run or (b) allow sampling with an M5 train prior to the beginning of the second run and use that data for the first test run. The latter choice was made since the incinerator was maintained at steady state and the same operating conditions were maintained in both the first and second runs.

C9. Problem: Heavy rains began about midway through a test run and stack sampling had to cease for about 4 hr. Sampling could not be resumed until about 11:00 p.m.

Resolution: The test was aborted due to the long delay, remaining sampling activities, and the late hour. Next day, the trial burn observer requested that a cover be put over the stack platform to help prevent reoccurrence of the problem. The applicant complied with the request with a minimum effort in about 2 hr.

C10. Problem: One of the two MM5 trains being used failed the leak check at port change.

Resolution: Another MM5 train was brought up to the stack and started anew. This meant that the other MM5 train and VOST finished sampling about 1 1/2 hr before the other MM5 train. However, all waste feed and scrubber water sampling was extended to cover the entire sampling period.

C11. Problem: One of the VOST traps was broken when it was removed from the sampling apparatus. Another pair of traps was run, but necessarily extended the VOST sampling time beyond completion of M5 and MM5 sampling.

Resolution: The observer required that pitot readings be taken during the last pair of VOST trap sampling to provide comparative data on stack gas velocity (i.e., confirm that there was no significant difference in stack flow rate).

C12. Problem: The VOST apparatus would not pass the leak check after inserting the second pair of traps. A several hour delay occurred in trying to correct the problem.

Resolution: The run was aborted and redone the next day.

C13. Problem: During recovery of the MM5 and M5 train, the pattern of the particulate on the filter extended clear to the edge of the filter, indicating that some particulate might have bypassed the filter.

Resolution: Based on the evidence, the run was considered invalid and had to be repeated. The sampling team made a minor change in the sampling train to help ensure that the problem was corrected for future runs.