US EPA ARCHIVE DOCUMENT

Pennsylvania
Base Program Description
Appendices XXI - XXXII

Commonwealth of Pennsylvania
Environmental Resources
November 27, 1984

Subject: Closure and Post-Closure Procedures

To: Regional Solid Waste Managers,
Operations Supervisors,
Facilities Supervisors

From: Gayle Leader, Acting Chief
Hazardous and Toxic Materials Section

Through: Acting Chief, Division of Hazardous Waste Management

Chief, Technical Services Section

Acting Chief, Compliance Section

The attached closure/post-closure procedure is to be implemented immediately by all regional offices. Please be certain your staff is aware of these new procedures.

You are responsible for developing an internal closure tracking system. One person in your office should be assigned the task of logging in the closure/post-closure plans, tracking the technical review, handling public notices and comments, assuring copies are sent to EPA and all other administrative steps set forth in the attached flow chart. If you have not already done so, please advise the central office of the person whom you have assigned these duties.

Samples of public notices, owner/operator certification form and engineering certification forms are also enclosed.

All EPA copies should be sent to:

Carl Spadaro
State Program Section 3HW31
EPA - Region III
Sixth and Walnut Streets
Philadelphia, PA 19106

In addition, reviews of closure plans for facilities not actively seeking closure is required by EPA during 1985. These reviews are classified as "record reviews" and were described in Rick Shipman's memo of November 13, 1984 to the regional offices.

Specific procedures for processing post-closure permits will follow at a later date. Please direct your questions to Gayle Leader or Joe Hayes.

Attachment

cc: B. Hofman, EPA
L. Kuchinski
J. Hayes
D. Shipman
M. Arnold
G. Leader
File (2)

GL:wek

Closure/Post Closure Procedures

Background

This guidance outlines the administrative procedures for the closure/post closure of all hazardous waste facilities that have qualified for interim status or operated after November 19, 1980. These procedures were developed in accordance with the existing and recently proposed DER regulations and requirements of EPA.

Types of Closures

Closure of hazardous waste facilities will fall into the four categories described below. In addition, facilities may have other circumstances, such as partial closure (closure of a portion of an otherwise active facility), cessation of business, request to withdraw a permit application, or an order to close. These situations do not affect the procedural steps for closure.

1. Closure of "regulated units": disposal facilities which received wastes after July 26, 1982.

2. Closure of other facilities, including disposal facilities which did not receive waste after July 26, 1982.

3. Facilities which had stored hazardous waste under interim status but are now reverting to less than 90-day storage.

4. Protective filers: those facilities which never operated under interim status requirements, e.g. never stored for greater than 90 days.

Closure Procedures

1, 2 Facilities proceeding with a "true" closure meeting either category 1 or 2 above should be handled according to the attached flow chart, briefly described here.

A. The facility submits its closure/post-closure plan, and post closure permit application if applicable, to the region.

B. The region distributes the plans and begins its technical review.

C. A notice of the closure plan receipt and request for public comment is published in the local newspaper (sample attached).

D. The region approves/disapproves the closure plan within 90 days of receipt as per 75.265(o)(6).

E. After final plan approval, facility proceeds with closure and submits its certifications of closure and revised notification form to the Department (samples attached).

F. A final closure inspection is performed by the region.

3. Facilities managing their waste under the generator accumulation clause (less than 90-day storage) will require a modified closure procedure, as follows.

A. The facility submits its closure plan in conjunction with its request to withdraw its permit application (Part A and/or B).

B. The region publishes a public notice of receipt of closure plan and request for public comment in the local newspaper.

C. The region performs an inspection to determine whether the plan is adequate, whether there is any evidence of existing contamination which needs to be addressed and reviews documentation demonstrating that the facility can, in fact, manage its waste within the requirements of 75.262(g). This inspection must be documented, e.g. an internal memo summarizing the inspection.

D. The closure plan is approved.

E. The facility implements the closure plan at some future date.

4. Facilities which were protective filers need only notify the region and/or central office of their status. The region should in turn make the central office aware of the circumstances by a brief memo explaining the situation.

.ttachments

The following attachments are provided for your use:

:losure/Post Closure Procedure Flow Chart

The Regional Office must follow this flow chart for all facilities proceeding with "true" closure. It is particularly important that the sequence order be followed, e.g. that ıe public notice appear prior to the closure plan approval, etc.

ample Public Notice

Public notices must appear once in a local newspaper of signficant circulation. : is preferable to use a small display ad, but if cost prohibits, a legal notice will suffice.

wner/Operator and Professional Engineer Certification Forms

SAMPLE FOR NEWSPAPER PUBLICATION

PUBLIC NOTICE OF RECEIPT OF A HAZARDOUS WASTE FACILITY CLOSURE PLAN

Pennsylvania Department of Environmental Resources
200 Pine Street
Williamsport, PA 17701

)ate of this notice: November 10, 1984

On November 5, 1984, the Hamilton Metal Plating Company, Hanczar, Pennsylvania, ubmitted to the Department of Environmental Resources at the above office notification of ts intent to remove waste from and close its hazardous waste surface impoundment located t the southwest corner of the facility property in accordance with a final Closure Plan ubmitted that day. This facility is located on Route 350 in Bittle Township, Centre County, 'ennsylvania.

Under the authority of the Pennsylvania Solid Waste Management Act of 1980, he Department will review the Closure Plan, make any necessary modifications and grant ermission to proceed with the closure activities.

The Closure Plan and comments received are available for review at the ennsylvania Department of Environmental Resources Office, 200 Pine Street, Williamsport, A 17701, between the hours of 8 a.m. and 4 p.m., Monday through Friday. Any person esiring further information or an appointment to inspect the documents should call Mr. Ken :aputo, Hazardous Waste Coordinator in Williamsport at (717) 327-3653. Persons wishing to omment on the Closure Plan or request a public hearing on the Closure Plan should submit ieir comments or requests in writing to Mr. Caputo at the above address. All valid comments eceived within the 30-day period ending December 10, 1984 will be considered in the final etermination of this Closure Plan.

Comments are requested only on the Closure Plan described above. Comments utside the scope of this Closure Plan will not be accepted nor acted upon.

ote: The Public Hearing Notice and Notice of Receipt should be combined into one Notice if a hearing is anticipated.

Notices must appear at least once in the daily newspaper of greatest local circulation at least 30 days prior to the hearing and/or end of public comment period. The Notice should appear as a small display advertisement, or if cost prohibits, in the legal notices column.

OWNER OR OPERATOR CERTIFICATION OF CLOSURE

The undersigned, ______________________________, a (1) Corporation,
(Name of Owner or Operator)
incorporated under the laws in the State of ____________ and licensed to do business in Pennsylvania, or (2) ____,
(Partnership, Individual, Municipality or Other Entity)
with its principal place of business at ________________________________, which
(Address)
formerly owned or operated a hazardous waste ______________________________
(Description of Hazardous Waste Activity)
(hereinafter "Facility") known as ______________________________ and
(Name of Hazardous Waste Facility)
located at ____
(Location)
in _____________ County, Pennsylvania, has completed and permanently ceased the active operation of the facility and has fully implemented all measures relating to the closure of the facility as set forth in the Closure Plan approved by the Pennsylvania Department of Environmental Resources for said facility.

NOW, THEREFORE, I (we) ____________________________________
(Name of Owner/Operator)
hereby swear and affirm that the above-named hazardous waste facility has been closed in accordance with the facility's Closure Plan approved in writing by the Department on ______________, 19__, that all measures relating to the closure of the facility required by the Closure Plan and the rules and regulations of the Department codified at 25 Pa. Code Chapter 75 have been fully implemented, and that to the best of my (our) knowledge, no violations continue to exist that may have arisen prior to closure.

____
(Signature)

____
(Title)

____
(Address)

Taken, sworn and subscribed before me, this
________ day of _______________ A.D. 19__

____

____
(Notary)

PROFESSIONAL ENGINEER CERTIFICATION OF CLOSURE

I, ______________________________, a Professional Engineer registered
(Name)
pursuant to the Professional Engineers Registration Law, 63 P.S. §§148 et seq., hereby certify that I have reviewed the Closure Plan for the ______________________ at
(Type of Facility)
______________________________ ("facility"), located
(Name of Hazardous Waste Facility)
at ______________________________
(Location)
that I am familiar with the rules and regulations of the Pennsylvania Department of Environmental Resources pertaining to closure of such facility, and that I personally have made visual inspection(s) of the aforementioned facility, and that the closure of the aforementioned facility has been performed in full and complete accordance with the facility's closure plan approved in writing by the Department of Environmental Resources on ______________________, 19___, and the rules and regulations of the Department codified at 25 Pa. Code Chapter 75.

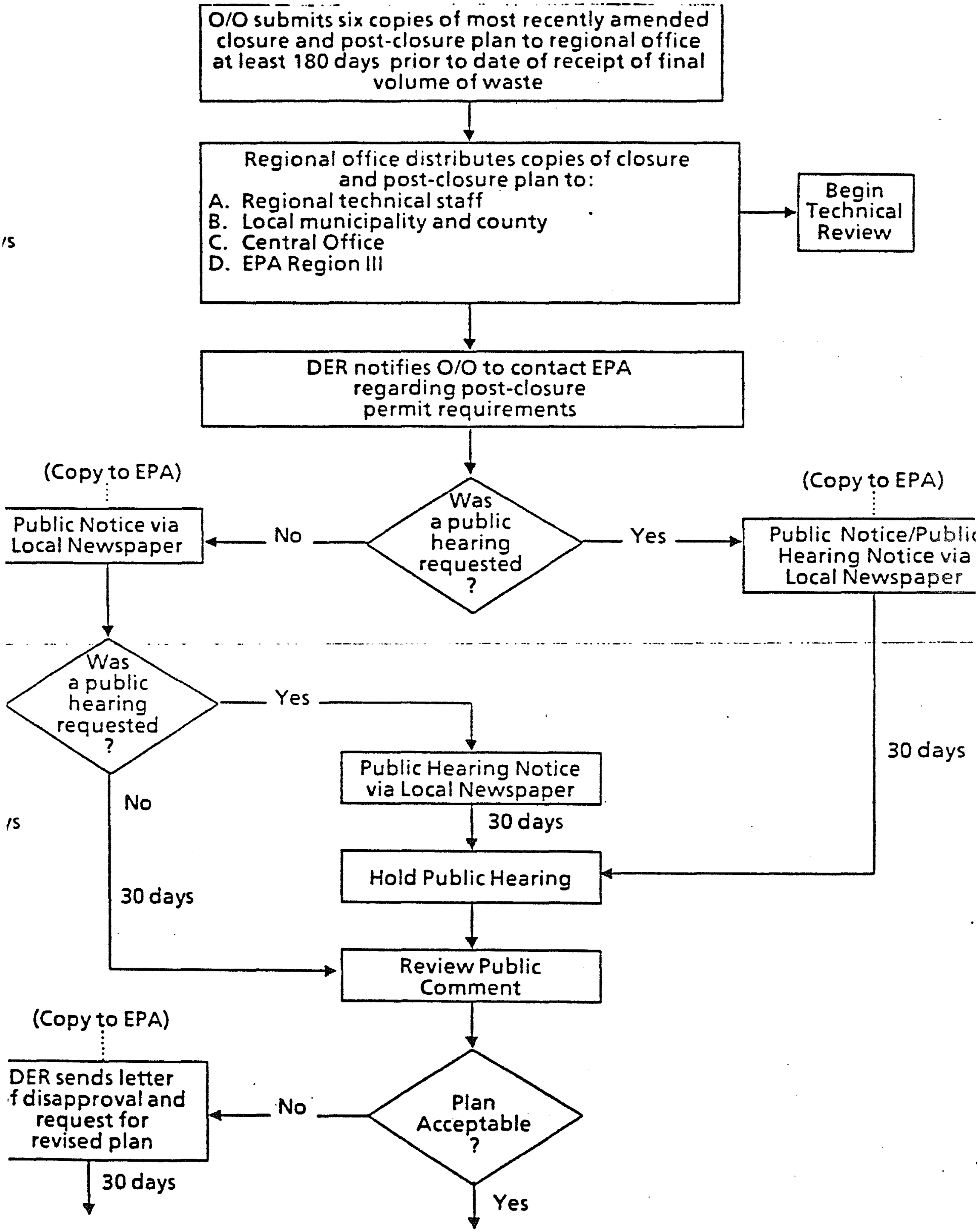
______________________________ ______________________
(Signature) (Date)

____
(Professional Engineering License Number)

____
(Business Address) (Seal)

____
(Telephone Number)

CLOSURE/POST-CLOSURE REVIEW PROCEDURE FOR FY85 CLOSURE COMMITMENTS



Plan Acceptable ?

Yes 60 days

No

ER modifies plan

60 days

O/O notified of plan approval or modification and permission to proceed

(Copy to EPA)

EPA issues draft post-closure permit

A. O/O must remove all hazardous waste within 90 days of plan approval or within 90 days after acceptance of final volume of waste (whichever is later), or as otherwise approved by the Department.
B. O/O must complete closure within 180 days of plan approval or within 180 days after receiving final volume of waste (whichever is later), or as otherwise approved by the Department.

Regional Office conducts inspection of closure activities as necessary.

Certification must be accomplished after completion of closure activities

A. O/O provides written certification (use Department form or equal).
B. Independent Pennsylvania registered professional engineer provides written certification (use Department form or equal).
C. O/O submits a notification form (ER-SWM-53) deleting activities.

Copies of Certification and Notification are forwarded to:

A. Regional File.
B. Central Office File (CO changes facility status on computer).
C. EPA Region III.

Regional Office verifies final closure with an on-site inspection.

(Copy to EPA)

O/O submits within 90 days after closure to the municipality and the Department a survey plat of location of wastes and cells and a record of type, location and quantity of wastes disposed on property.

(Copy to EPA)

O/O must indicate on deed if hazardous waste was ever disposed of on the property.

NOTE: Regions will supply copies of plan revisions and technical comments upon written request from EPA

HAZARDOUS WASTE PERMITTING
PROGRAM OVERSIGHT/QUALITY ASSURANCE

The Central Office quality oversight team is being established to assure the preparation of high quality and technically accurate permits or permit denials for hazardous waste facilities in Pennsylvania. The manager of the oversight team will be the Chief, Hazardous Waste Facilities Section.

The main functions of the oversight team will be to: 1) coordinate the negotiation of EPA permitting grant commitments and to monitor Regional Office performance in meeting those commitments, and 2) review draft permits and permit denials prepared by the Regional Offices. The team will also provide technical assistance to Regional Office staff when requested. Staff persons from the Central Office team will act as a focal point for coordination and issue resolution between DER and EPA. This coordination is critical while the State and EPA continue to operate under a Cooperative Arrangement for joint Federal/State permitting. However, even after RCRA Final Authorization, coordination will continue to be important as EPA moves into an oversight mode, but maintains its authority to place additional permit conditions in State-issued permits (see 40 CFR 271.19).

While the Central Office review person(s) will work with Regional Office personnel to resolve issues and correct deficiencies, it will remain the responsibility of the Regional Offices to produce environmentally sound and high quality permit outputs in accordance with the EPA grant commitments. Regional Offices' performance in this area will be reviewed continuously by Central Office and documented to the Regional Solid Waste Manager and Regional Environmental Protection Director as necessary. The Regional Office must notify Central Office (Chief, Hazardous Waste Facilities Section) within five days of determining a grant commitment will be missed. A substitute activity should be identified. Central Office will be responsible for notifying EPA.

Program Oversight:

As part of the function of the Central Office quality oversight team, a "Regional Liaison" is being established for each Regional Office. The job of the Regional Liaison will be to:

1. Act as a focal point for negotiation and/or modification of RCRA grant commitments between the Central and Regional Office.

2. Assure regional commitments are consistent with EPA guidance and overall State priorities.

3. Assure Regional commitments are consistent with workload models, <u>available</u> Regional resources, and the expertise mix at that Regional Office.

4. Communicate frequently with other Regional Liaisons to assure consistent application of models, priorities, and policy.

5. Monitor Regional progress in meeting commitments.

6. Identify issues, e.g., missed commitments, to the Section and/or Division Chief on a regular basis (weekly).

7. Act as a focal point for resolution of Regional issues.

The Regional Liaisons for each office are identified below. This list of Regional Liaisons may occasionally be modified to accommodate personnel changes or vacancies within the Central Office.

Norristown	-	Joe Hayes
Wilkes-Barre	-	Gayle Leader
Harrisburg	-	David Friedman
Williamsport	-	David Friedman (Back-up - Gayle Leader)
Pittsburgh	-	Dale Voykin
Meadville	-	Doug Lorenzen

The primary contact for the Regional Liaison should be the Regional Facilities Chief or the Regional Hazardous Waste Coordinator. Occasionally, the Regional Solid Waste Manager will also have to be contacted, especially as concerns grant negotiations.

The Hazardous Waste Facilities Section Chief and/or Division Chief in Central Office should have moderately frequent formal communications, e.g., conference calls, meetings, with the Regional Solid Waste Manager. During these discussions, issues identified by the Regional Liaisons (or by the Regional Managers) should be resolved. Any issues that cannot be amicably resolved at this level must be identified to the Assistant Bureau Director. The Assistant Bureau Director and/or the Bureau Director may then exercise available options to resolve issues. These may include contact with the Regional Environmental Protection Director, and the Deputy Secretary's Office.

Regional communications with EPA on commitments and/or policy and issues should always come through the Central Office. However, Regional permit writers should maintain contact with individual EPA permit writers while permit application review and draft permit preparation are underway. Under no circumstance should the Regions switch commitments or resolve policy issues without Central Office involvement. The Facilities Division Chief or Hazardous Waste Facilities Section Chief will maintain primary contact with EPA on permit-related issues.

Quality Assurance:

Two levels of Central Office oversight review have been established to review the Regional Offices' permitting outputs. All draft permits or permit denials for non-major facilities will undergo at least a first level review. A Level II review will be conducted for all major facilities. Central Office staff will combine technical assistance efforts with draft permit review, whenever possible, to assure efficient use of staff time. The two review levels are described below. A checklist for each review level has been established (attached).

While general criteria for the level of Central Office review has been established, a degree of flexibility must be maintained. For example, in cases where numerous deficiencies have been idenitifed in a Level I review, a Level II review may be initiated at the discretion of the Hazardous Waste Facilities Section Chief. Central Office will return to the Regional Office, prior to completing the review, any draft permit found blatantly deficient.

The Regional Offices are expected to revise draft permits as necessary to address Central Office comments. Revisions must take place in a timely manner to assure submission to EPA in accordance with RCRA grant commitments. Central Office staff will follow-up with the Regional Offices to assure deficiencies are corrected.

Review Levels

Level I

Designed to be the least intensive of the Central Office reviews. Only the most critical areas of the draft permit and the overall completeness of the package will be reviewed. All draft permits and permit denials for non-major facilities will receive a Level I review. Predominately simple storage/treatment facilities will fall into this category. Workload expended by the Central Office is expected to amount to 3-5 workdays, with a turnaround time of 10 workdays. Site visits by Central Office staff may be performed at the discretion of the Hazardous Waste Facilities Section Chief.

Level II

Designed to be a moderately intensive Central Office review. In addition to elements reviewed under a Level I review, major elements of the draft permit will be evaluated, with special emphasis on the most environmentally significant aspects of facility design and operation, e.g. ground-water monitoring. All draft permits and permit denials for major facilities will undergo a review at this level. Workload expended by the Central Office is expected to amount to 10-15 workdays, with a turnaround time of 20 workdays. Early involvement of Central Office staff is encouraged to prevent any delays. A site visit by Central Office during the review process is recommended. It is expected that most Level II reviews will involve a site visit.

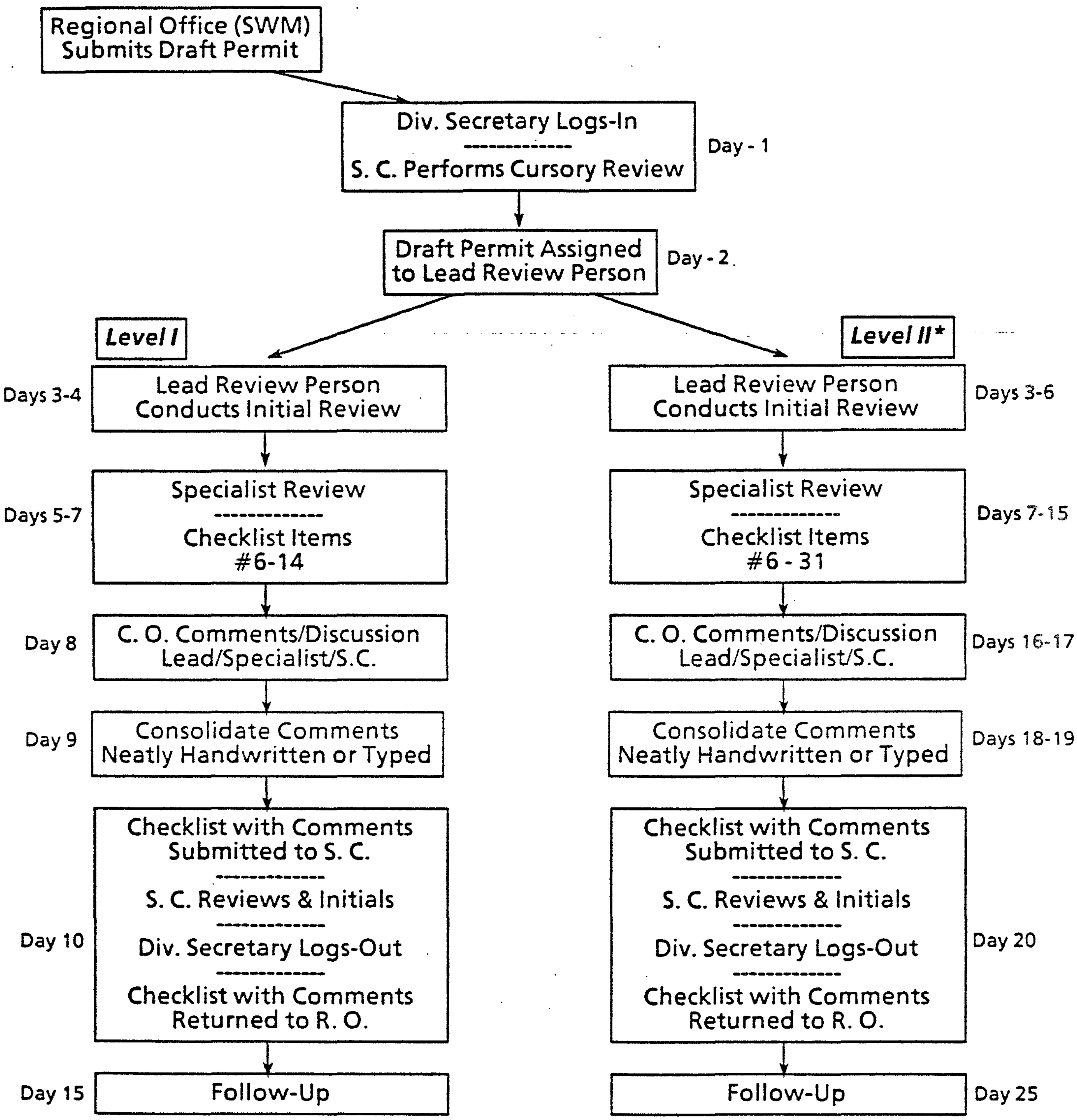
Technical Assistance

The Central Office will continue to provide technical assistance to the Regions. Regional Offices are encouraged to request such technical assistance in cases of complex or highly technical issues, e.g., liner compatibility, dike stability. Early involvement by Central Office in such issues will expedite the official oversight review of that draft permit.

Levels of Central Office Oversight

Review Level	Predominant Facility Types	Intensity of Review	C.O. Workload	Turnaround Time (R-C-R)	Site Visit
I	Non-Majors	Completeness/Critical Elements	3-5 workdays	10 workdays	Discretionary
II	Majors	Moderately Intensive/Major Elements	10-15 workdays	20 workdays	Recommended

FLOW CHART
Central Office Oversight Team
H. W. Permitting



***Central Office involvement early in the process is encouraged.**

CENTRAL OFFICE
OVERSIGHT REVIEW ELEMENTS

Review Elements	Review Levels I	II
Draft Permit in EPA Format	X	X
Draft Permit in DER Format	X	X
Fact Sheet - Completeness/Quality	X	X
All Attachments Present	X	X
General Review of Permit Conditions		
° Consistent with Model	X	X
° Appropriate to Facility Type	X	X
° Appropriate "Special" Conditions	X	X
Review of Attachments/Application Elements		
° Waste Identification Complete	X	X
° Waste Analysis Plan	X	X
° PPC Plan, Inspection Schedule, Training Outline, Topographic Map Requirements (one or more as needed)	-	X
° Plans and Specifications (Design)	-	X
° Closure Plan	X	X
° Post-Closure Plan (if applicable)	N/A	X
° Special Procedures (Ig, Rx, Incmp)	X	X
° C/P-C Cost Estimates	-	X
° Financial Assurance/Insurance	X	X
° G.W. Monitoring System (well locations, etc.)	N/A	X
° G.W. Sampling and Analysis Plan	N/A	X
° G.W. - Existing Data/Impacts	N/A	X
° Location Stds (Floodplains/Subsidence)	-	X
° Liner/Leachate Collection System (D&O)	N/A	X
° Liner Compatibility, Dike Stability (as needed)	N/A	X
° Run-on/Run-off (D&O)	-	X
° Buffer Zone Requirements	-	X
° Treatment Process (if applicable)	X	X
° (Containers Only) Storage Configuration	X	X
° (Incin Only) Trial Burn Plan/Data	N/A	X
° (Incin Only) Operating Requirements	N/A	X
° (L.T. Only) Land Treatment Demonstration	N/A	X
° (L.T. Only) U.Z.M. Plan	N/A	X
HSWA Requirements (RCRA Reauthorization)*		
° Info on All Solid Waste Units at the Facility	X	X
° Corrective Action/Schedule of Compliance for All Releases (Past and Present)	X	X
° Financial Responsibility to Complete Corrective Action	X	X
° Mandatory Five Year Re-opener Condition for L.F., W.P., S.I., L.T.	N/A	X
° Condition for Retrofitting (Double Liner) Existing Impoundments by Nov. 1988	N/A	X
° Exposure Assessments (Aug. 1985)	X	X

* These requirements must now be addressed in all permits issued by EPA. Their applicability and enforceability in State-issued permits is yet to be determined. As EPA provides further guidance and direction, these requirements (and possibly others) will be addressed in EPA permits prepared by DER. Until that time, DER will continue to prepare draft permits in accordance with the pre-HSWA program.

LEVEL I
REVIEW CHECKLIST

Facility ______________________ Date Received ______________

Process Codes __________________ Date Returned ______________

ID # __________________________ Lead Permit Reviewer ______________

Regional Office ________________ Site Visit Date ______________

	Initial	O.K.	Comments Attached
1. Draft Permit in EPA Format	______	______	______
2. Draft Permit in DER Format	______	______	______
3. Fact Sheet - Completeness/Quality	______	______	______
4. All Attachments Present	______	______	______
5. Permit Conditions			
a. Consistent with Model/Complete	______	______	______
b. Appropriate to Facility Type	______	______	______
c. Appropriate "Special" Conditions	______	______	______
6. Waste I.D. Complete	______	______	______
7. Waste Analysis Plan	______	______	______
8. Closure Plan	______	______	______
9. Special Procedures (Ig, Rx, Incmp)	______	______	______
10. Financial Assurance/Insurance*	______	______	______
11. Storage Configuration	______	______	______
12. Treatment Process (if applicable)	______	______	______
13. Other (list)** ______________	______	______	______
14. Other (list) ______________	______	______	______

* If not submitted with draft permit, review during follow-up.
** Assure all applicable provisions of the RCRA HSWA are addressed in EPA permits, e.g. continuing releases, corrective action, financial responsibility, exposure assessments.

Follow-up:

1. Date: __________ Contact: __________ Action/Resolution: __________

____

____

2. Date: __________ Contact: __________ Action/Resolution: __________

____

____

3. Date: __________ Contact: __________ Action/Resolution: __________

____

____

LEVEL II
REVIEW CHECKLIST

Facility ______________________ Date Received ______________

Process Codes __________________ Date Returned ______________

ID # __________________________ Lead Permit Reviewer ______________

Regional Office ________________ Site Visit Date ______________

	Initial	O.K.	Comments Attached
All Facilities:			
1. Draft Permit in EPA Format	____	____	____
2. Draft Permit in DER Format	____	____	____
3. Fact Sheet - Completeness/Quality	____	____	____
4. All Attachments Present	____	____	____
5. Permit Conditions			
a. Consistent with Model/Complete	____	____	____
b. Appropriate to Facility Type	____	____	____
c. Appropriate "Special" Conditions	____	____	____
6. Waste I.D. Complete	____	____	____
7. Waste Analysis Plan	____	____	____
8. Plans and Specifications (Design)	____	____	____
9. Closure Plan	____	____	____
10. Special Procedures (Ig, Rx, Incmp)	____	____	____
11. Financial Assurance/Insurance*	____	____	____
12. Storage Configuration (if applicable)	____	____	____
13. Treatment Process (if applicable)	____	____	____
14. Run-on/Run-off (D & O)	____	____	____
15. Buffer Zone Requirements	____	____	____
16. Other (list)[1] ____________	____	____	____
17. Other (list)[2] ____________	____	____	____
Land Disposal (S.I., W.P., L.F., L.T.):			
18. G.W. Monitoring System (well locations etc.)	____	____	____
19. G.W. Sampling and Analysis Plan	____	____	____
20. G.W. Existing Data/Impacts	____	____	____
21. Location Stds (Floodplain/ Subsidence)	____	____	____
22. Liner/Leachate Collection System (D & O)	____	____	____
23. Post-Closure Plan	____	____	____
24. Other (list)[3] ____________	____	____	____
25. Other (list)[3] ____________	____	____	____

* If not submitted with draft permit, review during follow-up.

[1] Review one (or more if needed) of the following: PPC Plan, Inspection Schedule, Training Outline, Topographic Map Requirements

[2] Assure all applicable provisions of the RCRA HSWA are addressed in EPA permits, e.g. continuing releases, corrective action, financial responsibility, exposure assessments,

[3] Review other critical elements of the design and operation at the facility e.g. dike stability (S.I.), liner compatibility. May also be reviewed as part of technical assistance provided to Region during application review.

LEVEL II (Continued)

	Initial	O.K.	Comments Attached
Incinerators:			
26. Trial Burn Plan/Data	______	______	______
27. Operating Requirements	______	______	______
Land Treatment:			
28. Land Treatment Demonstration	______	______	______
29. U.Z.M. Plan	______	______	______
Special Elements (list any other facility specific factors needing review):			
30. ______________________	______	______	______
31. ______________________	______	______	______

Follow-up:

1. Date: __________ Contact: __________ Action/Resolution: __________

2. Date: __________ Contact: __________ Action/Resolution: __________

3. Date: __________ Contact: __________ Action/Resolution: __________

RECEIVED
Director's Office
JUL 15 1983
Solid Waste Management

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

JUL 11 1983

DIRECTOR'S OFFICE
OFFICE OF STATE PROGRAMS
OPERATIONS

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

PIG-83-1

MEMORANDUM

SUBJECT: Definition of "Major Handlers" of Hazardous Waste

FROM: Lee M. Thomas
Assistant Administrator

TO: Program Implementation Guidance Addressees

ISSUE

What definition will provide consistency in the designation by EPA and authorized States of "major handlers" of hazardous waste?

DISCUSSION

Compliance with the 40 CFR Parts 270 and 271 requires certain hazardous waste handlers to be designated as "major." This designation is intended to identify, for administrative purposes, environmentally significant hazardous waste handlers and to be used in concentrating inspection, permitting, and reporting resources on those handlers.

The original definition of a "major handler" of hazardous waste, which was the subject of PIG-82-2 (May 14, 1982), was based on information available to the Agency at the time, including our experience with imminent hazard and Superfund sites. It was a first step in providing a uniform, nationally consistent standard to identify major handlers to serve as a focus for limited RCRA resources. As more data have become available, it has become evident that changes and clarifications to the existing definition could make it more useful in the implementation of RCRA. That revision is identified below.

The States and EPA Regional Offices should jointly develop pdated lists of designated "major handlers" based on this evised definition. The lists will be used by authorized States d the Regions for program implementation, budget decisions, spections, reporting, and permit overview. The increased tention which must be directed to these facilities is resource-tensive. Thus, the resulting lists of major handlers will be onsidered in the budget planning process for allocations of sources. The effective implementation date for this definition October 1, 1984. The Regions and the States will develop sts of major handlers on the basis of this definition during 1984 for use in FY 1985.

CISION

The following hazardous waste handling activities are to designated as "major":

I. All facilities subject to ground-water monitoring and/or protection requirements

II. All incinerators

III. Up to 10% of remaining TSDF's

IV. Up to 3% of generators and transporters

rcentages are to be based on the number of known handlers in DMS as of October 1, 1983. EPA or the State may add facilities, nerators or transporters to the list, subject to the 10% and 3% ilings, and shall notify the other party in writing. However, e deletion of any facility, generator or transporter must be reed to in writing by both parties. The list will be reviewed d renegotiated at least annually.

Reporting requirements in 40 CFR 270.5 or in the annual RA Guidance which refer to major handlers apply to the above-signated list. Those major handlers which comprise categories II, and III are designated as major facilities for EPA permit erview.

ATTACHMENT A

Commonwealth of Pennsylvania
Environmental Resources
November 13, 1984

t: Fiscal Year 1985 RCRA Grant Commitments for Compliance Monitoring and Enforcement

Regional Solid Waste Managers
Operations Chiefs
Field Supervisors
Facilities Chiefs
Hydrogeologists

D. Richard Shipman, Acting Chief DRS
Compliance Section
Division of Hazardous Waste Management

gh: Acting Chief, Division of Hazardous Waste Management AK

Chief, Technical Services Section

Hydrogeologist, Technical Services Section DPV

Acting Chief, Toxics and Hazardous Materials Section

Federal Fiscal Year 1985 (FY-85) began on October 1, 1984. The RCRA grant commitments made for compliance monitoring and enforcement-related activities are significantly different for this year than for past years and may require some adjustment in the use of your staff to meet these commitments. The emphasis on inspections and evaluations for FY-85 is on ground-water related facilities. I have attached the portions of the grant application that apply to these activities.

There are specific types of facilities that must be inspected as detailed on the "Inspection and Record Review Commitment Chart." The field staff should have little difficulty in achieving the commitments, but be certain that time is spent on the types of facilities that are required to be inspected. Specifically, these consist of all major handlers as designated on the FY-85 majors list. Non-majors are not specified and may be chosen at your discretion except for those that were permitted in 1984 (if any), FY-85 call-ins that EPA asks us to help them with, and those facilities closing in FY-85.

Major facilities that have ground-water monitoring (including post closure monitoring) must be inspected during the quarterly ground-water monitoring sampling. These inspections are of two types - the Comprehensive Monitoring Evaluations (CME) and Compliance Evaluation Inspections (CEI).

The CME's require DER to split samples during quarterly sampling being done by the facility or the facility's consultant, as well as evaluate the quality assurance procedures used in the sampling; well locations and well construction. These comprehensive evaluations are designed to be conducted by the hydrogeologist and documented on a yet-to-be-developed form from EPA. Until the CME form is available, we will use the Form No. 4's and No. 5's, a narrative summary, and the laboratory sample results to document CMEs. Specific facilities have been designated to receive CMEs and are noted in the attached package on page 36. These can be scheduled to be done at any time convenient to all involved, they should be coordinated with the Form 4. inspection schedule and because of the time involved and the desirability to avoid cold weather, it may be advisable to complete some in the first quarter (October, November, December) of FY-85.

The CEI inspections are the equivalent of the semiannual inspections we have been doing in the past. They consist of the Form 4 and Form 5 plus a narrative. All groundwater monitoring facilities that are not scheduled for a CME this year must have a CEI performed this year.

All facilities that closed in FY-84 are required to be inspected upon completion of closure activities, if such a final inspection was not conducted in FY-84. The commitment of eight such inspections on the Inspection and Record Review Commitment Chart was an estimate; we are attempting to compile a list of the facilities that have closed that have not had a final inspection. In addition, there will be closure inspections required for the facilities which withdrew their Part B applications. Since some of these facilities are not truly closing but are reverting to less than 90-day storage, the closure inspection will consist of an on-site inspection prior to approval of the closure plan, which will be implemented at a future date. All closure inspections should be clearly marked as such on the front sheet of the inspection report and the results of the inspection detailed on the comment sheet.

The final category is "record reviews". According to EPA, the only fundable record reviews are closure or post closure plan and cost estimate reviews and financial instrument and document reviews. Until our financial regulations are in place, only the closure, post closure plan reviews and cost estimate reviews count for record reviews for funding purposes. When a record review is done, a compliance monitoring and enforcement log sheet must be completed, attached to some document such as a letter to the applicant or an internal memo that summarizes the review, and sent to Central Office for logging and submission to EPA for credit for our commitment.

In order to meet the grant commitments, it may be necessary to adjust your staff assignments. Although the commitments significantly reduce the inspection frequency required, it is important for the Department to maintain a high profile in the regulated community as a preventive compliance activity. The emphasis on inspections beyond those required in the grant commitment (which we must do to get our federal funding) should be placed on commercial facilities, chronic violators and any hazardous waste activities that have never been inspected such as generators who notified but have never been inspected.

We are in the process of developing a system to log all inspections and record reviews to track our progress on meeting the commitments. We will periodically report to you on a statewide and regional basis on the progress when the logging system is in place. To assure that all inspections are credited to the proper category, please have the inspectors indicate at the top of all inspection reports if the inspection is of a major or non-major handler, and on all TSD inspection reports, the subcategory corresponding to the inspection and record review commitment chart (CEI (existing), CEI (post closure), incinerator, permitting in FY-84, call in FY-85, closed in FY-85, or other).

Your cooperation in this matter will assure our timely receipt of grant monies and may ultimately reduce our reporting requirements to EPA.

Attachments

cc: File
Reading File
Mr. Snyder
Mr. Kerns
Mr. Orwan

DRS:ses

(CMEs)

COMPREHENSIVE GROUND-WATER MONITORING EVALUATIONS TO BE PERFORMED IN FY 85

Second Quarter (December, January, February)

Existing

Kenametal	PAD004397683
RCA Corporation	PAD003026903
Abex Corporation	PAD004318416
Crompton and Knowles Corp.	PAD002917466
National Rolling Mills Inc.	PAD002324978
Kelly Run Sanitation Inc.	PAD004810222
David Kahn Inc.	PAD041520242
Koppers Company, Inc.	PAD056723285

Post-Closure

Fruehauf Corp.	PAD004338646
Penneco Division, Pennzal Products	PAD065626822

Fourth Quarter (July, August, September)

Existing

ALCOA Fasteners Division	PAD003026663
National Standard	PAD003023371
Seehan Limestone Industries, Inc.	PAD002860377
International Metals Reclamation Company	PAD087561015
Cabot Berylco Inc.	PAD044540136
GROWS Inc. Landfill	PAD000429589
Molycorp Inc.	PAD030068282
Mill Service Inc. (Yukon Site)	PAD004835146
Lyncott Corp.	PAD060506605
GTE Products Corp.	PAD003050846
Bethlehem Steel (Williamsport)	PAD003053758

Post-Closure

Drackett Inc.	PAD003038544
Pennex Aluminum Company	PAD003015716
SPS Technologies Incorporated	PAD000000554

UPDATED FY85 PENNSYLVANIA COMPLIANCE MONITORING AND INSPECTION AND COMMITMENT CHART 8/1/85

			1ST QTR				2ND QTR				3RD QTR				4TH QTR				TOTAL YTD	
	TOTAL	FED	COMMIT	FED	ACTUAL	FED	COMMIT	FED	ACTUAL	FED	COMMIT	FED	ACTUAL	FED	COMMIT	FED	ACTUAL	FED	ACTUAL	FED
MAJOR																				
GEN	64	3	16	0	18	1	16	1	16	1	16	1	36	0	16	1			70	2
TSP	3	0	1	0	1	0	0	0	4	0	1	0	1	0	1	0			6	0
TSDF'S																				
G W MONIT EXISTING																				
CEI	40	0	0	0	12	0	23	0	9	0	0	0	2	0	17	0			23	0
CME	19	0	0	0	2	0	8	0	3	0	0	0	0	0	11	0			5	0
G W POST CLOSURE																				
CEI	9	0	0	0	0	0	4	0	4	0	0	0	0	0	5	0			4	0
CME	5	0	0	0	0	0	2	0	1	0	0	0	0	0	3	0			1	0
INCIN	10	0	2	0	3	0	3	0	1	0	3	0	0	0	2	0			4	0
PERM IN FY84	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0			0	0
STOR & TRT PERM IN FY84 NO G W MONIT	1	0	0	0	2	0	1	0	2	0	0	0	1	0	0	0			5	0
CALL IN FY85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
CALL IN FY85 NOT REQ G W MONIT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
FAC CLOSE IN FY85	6	0	2	0	1	0	1	0	0	0	1	0	0	0	2	0			1	0
OTHER MAJ TSDF'S	67	0	16	0	78	1	17	0	79	0	17	0	62	2	17	0			219	3
SUB TOT MAJ TSDF'S	157	0	20	0	98	1	59	0	99	0	21	0	65	2	57	0	0	0	262	3
TOTAL MAJOR INSP	224	3	37	0	117	2	75	1	119	1	38	1	102	2	74	1	0	0	338	5

FY85 PENNSYLVANIA COMPLIANCE MONITORING AND INSPECTION AND COMMITMENT CHART

	TOTAL	FED	1ST QTR COMMIT	FED	1ST QTR ACTUAL	FED	2ND QTR COMMIT	FED	2ND QTR ACTUAL	FED	3RD QTR COMMIT	FED	3RD QTR ACTUAL	FED	4TH QTR COMMIT	FED	4TH QTR ACTUAL	FED	TOTAL YTD ACTUAL	FED
NON-MAJ																				
GEN	166	0	41	0	150	0	42	0	160	2	42	0	136	1	41	0			446	3
TSP	15	0	4	0	26	0	4	0	16	0	4	0	15	0	3	0			57	0
TSDF'S																				
FAC PMT IN FY84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
FY85 CALL INS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
FAC CLOSED IN FY85	6	0	0	0	1	0	1	0	0	0	2	0	4	0	3	0			5	0
OTH NON-MAJ TSDF'S	54	0	13	0	39	0	13	0	39	0	14	0	35	0	14	0			113	0
SUB TOT NON-MAJ-TSDF	60	0	13	0	40	0	14	0	39	0	16	0	39	0	17	0	0		118	0
TOTAL NON MAJORS	241	0	58	0	216	0	60	0	215	0	62	0	190	0	61	0	0		621	0
FAC CLOSED IN FY84 CMI'S	11	1	4	1	4	1	2	0	1	0	2	0	1	0	3	0			6	1
RECORD REVIEWS																				
MAJOR TSDF																				
CL/P-CL	111	3	10	0	14	1	14	1	10	0	43	2	14	0	44	0			38	1
FIN INST	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0			1	0
NON-MAJOR TSDF																				
CL/P-CL	21	0	10	0	14	0	11	0	14	0	0	0	15	2	0	0			43	2
FIN INST	5	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0			0	0

PENNSYLVANIA
PROPOSED FY-84 FORM 4 INSPECTION SCHEDULE
(HAZARDOUS WASTE, GROUND-WATER MONITORING)

6/4/84

Facility	Month	Regional Office
(Ordering Consistent with the Hazardous Waste Monitoring Status List)		
Kennametal Inc. PAD004397683	January (85)	Harrisburg
Bethlehem Steel Corporation, Steelton Plant PAD003026531	July, January (85)	Harrisburg
ALCOA Fastners Division - Lancaster Works PAD003026663	January (85)	Harrisburg
Lanchester ~~Lancaster~~ Corp. Stabilized Site (operated by Converstion Systems) PAD980550545	January (85)	Harrisburg
National Standard (Mt. Joy) PAD003023371	December	Harrisburg
Lancaster Metal Science Corp. PAD082434747	December	Harrisburg
Raybestos - Manhattan (Raymark) PAD003015328	December	Harrisburg
RCA Corporation PAD003026903	January (85)	Harrisburg
Molycorp Inc. PAD003025624	January (85)	Harrisburg
Pennex Aluminum Company PAD003015716	January (85)*	Harrisburg
Root Corp., (Ramshead Wire) PAD098377737	November	Harrisburg
ARMCO, Inc., Butler Works PAD004325254	December	Meadville
Penreco Division, Pennzoil Products PAD065626822	June, December	Meadville
Sechan Limestone Industries Inc. PAD002860377	July, January (85)	Meadville
Warrendale Plating Co. PAD004386629	November	Meadville

(*-Post Closure Monitoring)

Facility	Month	Regional Office
Witco Chemical Corp. PAD04388500	June, December	Meadville
Vogel Disposal Service Inc. PAD005820691	November	Meadville
Abex Corp. PAD004318416	December	Meadville
Textron Inc., Talon Division PAD980550149	December	Meadville
The Stackpole Corp. PAD063652820	July, January (85)	Meadville
General Electric Company PAD005033055	November	Meadville
International Metals Reclamation Company PAD087561015 (INMETCO)	December	Meadville
Sharon Steel Corporation PAD001933175	July, January (85)	Meadville
Pennzoil Rouseville Refinery PAD004329835	July, January (85)	Meadville
National Forge Company PAD002101418	June, December	Meadville
Baldwin Hardware Manufacturing Corp. PAD002350833	July, January (85)	Norristown
Brush - Wellman Inc. PAD002387835	July, January (85)	Norristown
Cabot Berylco Inc. ~~PAD002335545~~ PAD044540136	July, January (85)	Norristown
Crompton and Knowles Corp. PAD002917466	November	Norristown
E. Penn Mfg Western Berks Refuse Authority PAD000443705	July, January (85)	Norristown
Ametex - US Guage Division PAD002342236	December	Norristown

Facility	Month	Regional Office
CROWS Inc. Landfill PAD000429589	July, January (85)	Norristown
Naval Air Development Center PA6170024545	December	Norristown
Stauffer Chemical (Morrisville Plant) PAD002336410	July, January (85)	Norristown
United State Steel Corp. (Fairless Hills) PAD002375376	June, December	Norristown
National Rolling Mills Inc. PAD002324978	June, December	Norristown
Boyertown Sanitary Disposal Co., Inc. PAD048603005	June, December	Norristown
SPS Technologies Incorporated PAD000000554	December	Norristown
Stanly G. Flagg & Company PAD001737899	July, January (85)	Norristown
Uniform Tubes Inc. PAD002344463	July, January (85)	Norristown
American Nickeloid Co. PAD002399285	November	Norristown
Bethlehem Steel Corp. (Bethlehem) PAD990824161	May, November	Norristown
Penn Power & Light Co. (Martins Creek) PAD000765388	November	Norristown
ARCO Petroleum Products Company PAD002289700	July, January (85)	Norristown
Boeing Vertol Company PAD096837356	June, December	Norristown
Philadelphia Coke Company Inc. PAD000427906	December	Norristown
Edgewater Steel Company PAD074966789	December	Pittsburgh
Kelly Run Sanitation Inc. PAD004810222	December	Pittsburgh

Facility	Month	Regional Office
Municipal & Industrial Disposal Company PAD000436014	November	Pittsburgh
U. S. Steel Corp. - Taylor Landfill PAD000739672	November	Pittsburgh
Babcock & Wilcox, Koppel Facility PAD000651752	May, November	Pittsburgh
J & L Steel - Midland Plant (Formerly Crucible Stainless Steel) PAD004340444	December	Pittsburgh
Industrial Waste Corp. (Darlington) PAD000621839	January (85)	Pittsburgh
J & L Steel (Blacks Run) PAD000805028	November	Pittsburgh
Bethlehem Steel Corp. (Johnstown) PAD004344222	January (85)	Pittsburgh
Fruehauf Corp. PAD004338646	December	Pittsburgh
Mill Service Inc. (Bulger Plant) PAD059087072	January (85)	Pittsburgh
Alcoa Technical Center PAD004393138	July, January (85)	Pittsburgh
Mill Service Inc. (Yukon Site) PAD004835146	January (85)	Pittsburgh
Molycorp Inc. PAD030068282	December	Pittsburgh
Norwin Plating Company PAD051136984	June, December	Pittsburgh
New Jersey Zinc Company PAD002395887	December	Wilkes-Barre
Tonolli Corp. PAD073613663	May, November	Wilkes-Barre
Drackett Inc. PAD003038544 GII PAD0E1621096	~~July~~ 6/11/84	Wilkes-Barre
Kahn, David Inc. PAD041520242	November	Wilkes-Barre

Facility	Month	Regional Office
Keystone Chemical Company PAD000647735	December	Wilkes-Barre
Lyncott Corp. PAD060506805	November	Wilkes-Barre
Piper Aircraft (Karthaus) PAD000650481	November	Williamsport
American Color and Chemical Corp. PAD003047792	December	Williamsport
Drake Chemicals Inc. PAD003058047	December	Williamsport
Bethlehem Steel Corp. (Williamsport) PAD003053758	January (85)	Williamsport
GTE Products Corp. PAD003050846	December	Williamsport
Koppers Company Inc. (Montgomery) PAD056723265	December	Williamsport
Merck and Company, Inc. PAD003043353	January (85)	Williamsport
Emporium Specialty Corp. PAD002101335	November	Williamsport

(*-Post-Closure Monitoring)

FY 1985 HAZARDOUS WASTE COMPLIANCE MONITORING AND ENFORCEMENT LOG

1. EPA ID: |_|_|_|_|_|_|_|_|_|_|_|_|

2. HANDLER NAME: ______________________________

3. ADDRESS: ______________________________

4. Handler Type: ☐ Major ☐ Non-Major

5. DATE OF INITIAL EVALUATION WHICH IS THE BASIS FOR THIS REPORT: __/__/__

5a. AGENCY RESPONSIBLE FOR EVALUATION: Put code in box ☐ Choose one

- E = EPA
- S = State
- J = Joint
- C = Contractor/EPA
- O = Other
- B = Contractor/State
- X = Oversight

6. TYPE OF EVALUATION COVERED BY THIS REPORT: ☐ Put code in box Choose one

- 1 = Evaluation Inspection
- 2 = Sampling Inspection
- 3 = Record Review
- 4 = Ground Water Monitoring Evaluation
- 5 = Follow Up
- 6 = Other - Citizen Complaint
- 7 = Other - Part B Call-In
- 8 = Other - Withdrawal Candidate
- 9 = Other - Closed Facility
- 0 = Other - General

7. DATE OF EVALUATION COVERED BY THIS REPORT (enter only if different from 5): __/__/__

8. AREA AND CLASS OF VIOLATION (enter 'X' in appropriate box if violations found. Enter '0' if no violations found in Area violated.)

Class of Violation	Area of Violation						
	GWM	CL/PC	Fin.Res	Pt. B	Cmpl.Sch	Manifest	Other
I							
II							

9. ENFORCEMENT ACTIONS:

Class	Area of Violation	Type (use code)	Date Action Taken	Compliance Dates		Penalty		Resp.Ag. (use code)
				Scheduled	Actual	Assessed	Collected	

Codes for Types of Enforcement Actions: 03 = Warning Letter/NOV. 05 = Administrative Order 10 = Informal 11 = Filed Civil Action 12 = Filed Criminal Action

(See instruction for additional codes)

Codes for Responsible Agency: E = EPA, S = State X = EPA oversight

10. Comments: ______________________________

FACILITY STATUS SHEET

PURPOSE AND BACKGROUND

The Facility Status Sheet will provide information which EPA will use to develop an overall picture of the status of "major" facilities with respect to interim status ground-water monitoring, closure, post-closure, and financial responsibility requirements (40 CFR 265, Subparts F, G & H). EPA will return summary reports on this information to states to use in administering their hazardous waste management programs and will use the information to carry out its role as manager of the national RCRA program: to assess progress; to develop estimates of future resource needs; to identify areas which need improvement and to determine whether improvements should be accomplished through better guidance or additional regulations; and to report to Congress.

States should fill out the Status Sheet for every major facility subject to standards analagous to the Federal Part 265 standards. For the purposes of this form, major facilities include all incinerators, all facilities where ground-water monitoring is required (surface impoundments, landfills and land treatment facilities) and any other facilities the states have designated as major facilities.

If a state wishes to do so, the Facility Status Sheet may also be used to meet their responsibilities to monitor and provide information on non-major facilities.

Questions 1-7 cover the facility's status with respect to applicable ground-water monitoring requirements. These questions address the type of monitoring program required at the facility, as well as the existence and adequacy of well systems, sampling and analysis programs, records and reports, and waiver demonstrations.

Question 8 collects information on the types of activities at each facility subject to hazardous waste management regulations. All hazardous waste treatment, storage and disposal activities are subject to closure plan requirements, without exception.

Questions 9-14 collect information on the presence and adequacy of a facility's closure and post-closure plans, cost estimates and financial assurance instruments and the types of financial instruments the facility is using.

Questions 15-16 collect information on the type and adequacy of a facility's sudden and nonsudden liability instruments.

Questions 17-18 collect information on the status of facilities that have either begun closure or that have closed.

Question 19 collects information on the reasons that a facility's permit was called.

HOW TO COMPLETE THE STATUS SHEET

Specific instructions for filling out the Status Sheet are attached. States should include the name of a state contact person for any follow-up questions, the data the form is completed, and a check indicating whether it is a major or non-major facility.

EPA developed the Status Sheet so that it could be completed by state inspectors immediately upon completing an inspection or record review. However, assigning this responsibility is a state decision which will depend on how a state RCRA program office is organized, whether the program is implemented through field offices, whether a central data unit or person is assigned to consolidate and verify the data reported in these forms, or whether the state is already collecting some of this information using another procedure.

State personnel completing the Status Sheet should check "NE" (not evaluated) when they have not analyzed the adequacy of a document, system, etc. There are two situations that could require respondents to check "NE". These are: 1) the document is not present; or 2) the document is present but has not yet been evaluated. In order to distinguish between these two situations, respondents should also check "NO" to the adequacy portion of the question when the document is not present, and should leave that portion of the question blank when the document is present but has not been evaluated.

Filling Out the Status Sheet Initially

When filling out the Status Sheet for the first time, staff should check "NEW" on the first page of the form. For this initial data entry, states should answer each question (unless a particular answer to a question allows you to skip certain questions). For the first report, states should use all available information (inspection reports, Part B applications, plans and financial instruments facilities have submitted, etc.) However, it may be necessary to perform an inspection or to request information from facilities to obtain all data required to provide appropriate responses.

Updating the Status Sheet

When updating the Status Sheet, staff should check "update" on the first page of the form. An update report should be submitted when the state becomes aware of a change in a facility's status with respect to any applicable ground-water monitoring, closure/post-closure or financial responsibility requirements. States may learn of a change through an inspection, a Part B submission, or other sources. When updating the Status Sheet, states only need to answer those questions where data have changed from the initial or previous update reports.

Determining Adequacy

Several of the questions on the Status Sheet require data on the adequacy of plans, systems, cost estimates, etc. In making determinations of adequacy, state staff must consider more than the presence or absence of required documents, wells, etc. These determinations should be based on a thorough review, using the evaluator's best judgment and the applicable state and EPA regulations and guidance manuals (where available).

In keeping with this approach, staff can only evaluate the adequacy of closure and post-closure cost estimates and the amount of the financial assurance instruments if the corresponding plan is adequate. If the plan has been evaluated and determined to be inadequate, state personnel completing the Status Sheet should not attempt to evaluate the adequacy of the corresponding cost estimate and the amount of the assurance instrument, but should wait until there is an adequate plan on which to base these determinations.

However, in the absence of adequate closure and post-closure plans and/or cost estimates, the actual financial instrument (wording, issuer qualifications, etc.) should be reviewed for compliance with Federal or State regulations.

SPECIFIC INSTRUCTIONS FOR FACILITY STATUS SHEET

Enter the name of the state contact person and the date the form is completed in the box located in the top right corner of the form.

BLOCK A

EPA ID:	Enter the facility's EPA ID number.
Facility Name:	Enter the facility's name.
Entry Type:	Enter an "x" in the appropriate box to indicate whether the information contained on the form is initial data or an update of data.
Facility Type:	Enter an "x" in the appropriate box to indicate whether the facility is a major or non-major facility.

GROUND-WATER MONITORING (Questions 1-7)

1. A. Status (answer only one)

Check DETECTION if the facility is using indicator parameters to "detect" a possible release. Go to #2.

Check ASSESSMENT if either the facility is implementing an "alternate" monitoring program or has been "triggered" into an assessment monitoring program. Go to #2.

Check WAIVER if the facility is subject to ground-water monitoring requirements but has claimed a full "waiver" under applicable regulations. Go to #6.

Check NA if the facility is exempt from ground-water monitoring requirements (e.g., an incinerator or other TSD that is not a "land disposal" facility). Go to #8.

2. Ground-water Monitoring Well System

A. Evaluated?

Check NE if the ground-water monitoring well system has not been evaluated or is not present.

Fill in the DATE EVALUATED if the well system has been evaluated.

B. Adequate?

Check YES if the monitoring well system was evaluated and judged adequate.

Check NO if the monitoring well system was evaluated and judged inadequate or the required system is not present.

3. Ground-water Sampling, Analysis and Evaluation Program

A. Evaluated?

Check NE if the ground-water sampling, analysis and evaluation program has not been evaluated or is not present.

Fill in the DATE EVALUATED if the sampling and analysis program has been evaluated.

B. Adequate?

Check YES if the program was evaluated and judged adequate.

Check NO if the program was evaluated and judged inadequate or if the required program is not present.

4. Notice of Significant Increase in Indicator Concentrations

A. Submitted?

Check NO if "Detection" or "Assessment" is checked in #1, and no notice of a significant increase in indicator concentrations has been submitted.

Fill in the DATE the most recent notice of significant increase in indicator concentrations was submitted if "Detection" or "Assessment" is checked in #1.

5. Ground-Water Quality Assessment Report

A. Submitted?

Check NO if "Assessment" is checked in #1 and no assessment report has been submitted, and proceed to #6.

Fill in the DATE the most recent ground-water quality assessment report was submitted.

B. Evaluated?

Check NE if the ground-water quality assessment report has not been evaluated and proceed to #6.

Fill in the DATE EVALUATED if the assessment report has been evaluated.

C. Adequate?

Check YES if the assessment report was evaluated and judged adequate.

Check NO if the assessment report was evaluated and judged inadequate.

D. Showed hazardous constituents in ground water?

Check YES if the assessment report showed hazardous waste constituents in the ground water.

Check NO if the assessment report did not show hazardous waste constituents in the ground water.

6. Waiver Demonstration

A. Evaluated?

Check NE if "Waiver" is checked in #1 and the waiver demonstration has not been evaluated or is not present.

Fill in the DATE EVALUATED if the waiver demonstration has been evaluated.

B. Adequate?

Check YES if the waiver demonstration was evaluated and judged adequate.

Check NO if the waiver demonstration was evaluated and judged inadequate or the required demonstration is not present.

7. Ground-Water Monitoring Records

A. Evaluated?

Check NA if "Waiver" is checked under #1 and go to #8.

Check NE if the monitoring records have not been evaluated or are not present.

Fill in the DATE EVALUATED if the monitoring records have been evaluated.

B. Adequate?

Check YES if the monitoring records were evaluated and judged adequate.

Check NO if the monitoring records were evaluated and judged inadequate or the required records are not present.

CLOSURE/POST-CLOSURE PLANS, COST ESTIMATES AND FINANCIAL ASSURANCE (Questions 8-18)

8. Activities Subject to Closure/Post-Closure

Check the TYPE(S) of hazardous waste activities at the facility that are subject to the Closure/Post-Closure requirements (RCRA Subpart G). Specify any additional treatment, storage, or disposal activities that are not listed.

9. Closure Plan

A. Evaluated?

Check NA if the facility is not required to have a closure plan and go to #10.

Check NE if the closure plan has not been evaluated or is not present.

Fill in the DATE EVALUATED if the closure plan has been evaluated.

B. Adequate?

Check YES if the closure plan was evaluated and judged adequate.

Check NO if the closure plan was evaluated and judged inadequate or the plan is not present.

10. Closure Cost Estimate

A. Evaluated?

Check NA if the facility is not required to have a closure cost estimate and go to #11.

Check NE if the facility is required to have a closure cost estimate and:

i) the closure cost estimate has not been evaluated; or
ii) the closure cost estimate is not present; or
iii) "NO" is checked in #9B (there is no basis for evaluating the adequacy of the closure cost estimate).

Fill in the DATE EVALUATED if the closure cost estimate has been evaluated.

B. Adequate?

Check YES if the closure cost estimate was evaluated and judged adequate.

Check NO if the closure cost estimate was evaluated and judged inadequate or the cost estimate is not present.

C. Amount?

Fill in the AMOUNT of the closure cost estimate for the facility, whether it has been evaluated or not. If the amount of the cost estimate is unknown, check "UNKNOWN."

11. Closure Assurance Instrument(s)

A. Evaluated?

Check NA if the facility is not required to have a closure assurance instrument and go to #12.

Check NE if the facility is required to have a closure assurance instrument and:

i) the closure assurance instrument has not been evaluated; or
ii) the closure assurance instrument is not present

Fill in the DATE EVALUATED if the closure assurance instrument has been evaluated.

B. Adequate?

Check YES if the closure assurance instrument was evaluated and judged adequate.

Check NO if the closure assurance instrument was evaluated and judged inadequate or the instrument is not present.

C. Instrument Type(s)?

Check the TYPE(S) of closure assurance instrument(s) the facility is using. Complete this entry even if the assurance instrument was determined to be inadequate.

12. Post-Closure Plan

A. Evaluated?

Check NA if the facility is not required to perform post-closure care and go to #13.

Check NE if the facility is required to have a post-closure plan and the plan has not been evaluated or is not present.

Fill in the DATE EVALUATED if the post-closure plan has been evaluated.

B. Adequate?

Check YES if the post-closure plan was evaluated and judged adequate.

Check NO if the post-closure plan was evaluated and judged inadequate or the plan is not present.

13. Post-closure Cost Estimate

A. Evaluated?

Check NA if the facility is not required to have a post-closure cost estimate and go to #14.

Check NE if the facility is required to have a post-closure cost estimate and:
i) the post-closure cost estimate has not been evaluated; or
ii) the post-closure cost estimate is not present; or
iii) "NO" is checked in #12B (there is no basis for evaluating the post-closure cost estimate).

Fill in the DATE EVALUATED if the post-closure cost estimate has been evaluated.

B. Adequate?

Check YES if the post-closure cost estimate was evaluated and judged adequate.

Check NO if the post-closure cost estimate was evaluated and judged inadequate or the cost estimate is not present.

C. Amount?

Fill in the AMOUNT of the post-closure cost estimate for the facility, whether it has been evaluated or not. If the amount of the cost estimate is unknown, check "UNKNOWN".

14. Post-Closure Assurance Instrument(s)

A. Evaluated?

Check NA if the facility is not required to have a post-closure assurance instrument, and go to #15.

Check NE if the facility is required to have a post-closure assurance instrument and:
i) the post-closure assurance instrument has not been evaluated; or
ii) the post-closure assurance instrument is not present

Fill in the DATE EVALUATED if the post-closure assurance instrument has been evaluated.

B. Adequate?

Check YES if the post-closure assurance instrument was evaluated and judged adequate.

Check NO if the post-closure assurance instrument was evaluated and judged inadequate or the instrument is not present.

C. Instrument Type(s)?

Check the TYPE(S) of post-closure assurance instrument(s) the facility is using. Complete this entry even if the assurance instrument was determined to be inadequate.

15. Sudden Liability Instrument(s)

A. Evaluated?

Check NA if the facility is not required to have sudden liability coverage, and proceed to #16.

Check NE if the facility is required to have sudden liability coverage but the sudden liability instrument has not been evaluated or is not present.

Fill in the DATE EVALUATED if the sudden liability instrument was evaluated.

B. Adequate?

Check YES if the sudden liability instrument was evaluated and judged adequate.

Check NO if the sudden liability instrument was evaluated and judged inadequate or the instrument is not present.

C. Amount?

Fill in the AMOUNTS of sudden liability coverage the instrument(s) provides for both "per occurrence" and "annual aggregate" levels, whether judged adequate or inadequate.

D. Instrument Type(s)?

Check the TYPE(S) of sudden liability instrument(s) the facility is using, whether judged adequate or inadequate.

16. Nonsudden Liability Instrument(s)

A. Evaluated?

Check NA if the facility is not required to have nonsudden liability coverage, and proceed to #17.

Check NE if the facility is required to have nonsudden liability coverage but the instrument has not been evaluated or is not present.

Fill in the DATE EVALUATED if the nonsudden liability instrument was evaluated.

B. Adequate?

Check YES if the nonsudden liability instrument was evaluated and judged adequate.

Check NO if the nonsudden liability instrument was evaluated and judged inadequate or the instrument is not present.

C. Amount?

Fill in the AMOUNTS of nonsudden liability coverage the instrument(s) provides for both "per occurrence" and "annual aggregate" levels whether judged adequate or inadequate.

D. Instrument Type(s)?

Check the TYPE(S) of nonsudden liability instrument(s) the facility is using, whether judged adequate or inadequate.

17. Closure Process

A. Process Begun?

Check NO if the facility has not yet begun the closure process (no advance submission of the closure plan, no closure activities occurring, etc.), and go to # 18.

Fill in the DATE the facility began the closure process. This should be the date the facility submitted the closure plan for approval or, if closure activities began before the plan was submitted, the date closure activities first began.

B. In accordance with approved plan and required procedures?

Check YES if the closure activities that have occurred, up to the point of the most recent inspection, are in accordance with the closure requirements.

Check NO if the closure activities that have occurred, up to the point of the most recent inspection, are not in accordance with the closure requirements.

C. Closure certification(s) received?

Check NO if the closure certifications, due at the completion of closure, have not yet been received (whether they are due yet or not) and go to #18.

Fill in the DATE the closure certification(s) was received (if submitted separately, fill in the latter date).

D. Facility released from closure assurance and liability requirements?

Check NA if the facility is not required to have closure financial instruments and liability coverage.

Check NO if the facility is required to have closure financial instruments and liability coverage, but the owner or operator has not yet been released from the requirements.

Fill in the DATE the owner or operator was released from the financial requirements after the submission of the closure certifications.

18. Post-Closure Process

A. Process Begun?

Check NA if the facility is not required to perform post-closure care and go to #19.

Check NO if the facility has not yet begun post-closure activities (the disposal facility has not yet begun or completed closure), and go to #19.

Fill in the DATE the facility began post-closure activities (date the closure certification(s) was received).

B. In accordance with approved plan and required procedures?

Check YES if the post-closure activities that have occurred, up to the point of the most recent inspection, are in accordance with the post-closure requirements.

Check NO if the post-closure activities that have occurred, up to the point of the most recent inspection, are not in accordance with the post-closure requirements.

C. Survey plat/record of wastes received?

Check NO if the survey plat and record of wastes have not been received (whether they are due yet or not).

Fill in the DATE the survey plat and record of wastes were received (if submitted separately, fill in the latter date).

D. Post-closure period completed?

Check NO if the post-closure period is not completed.

Fill in the DATE the post-closure period was completed.

E. Facility released from post-closure assurance and liability requirements?

Check NA if the facility is not required to have post-closure financial instruments.

Check NO if the facility is required to have post-closure financial instruments, but the owner or operator has not yet been released from the requirements.

Fill in the DATE the owner or operator was released from the post-closure financial requirements after the completion of the post-closure period.

19. Permit Application

A. Called?

Check NO if the Part B permit application for the facility has not been called in.

Fill in the DATE the Part B application was called in.

B. Reason?

Check all REASONS for calling in the Part B application that are appropriate.

20. Comments

The comment block is used to record a short note or message concerning information provided in previous blocks on this form. The message or "comment" must be limited to 80 characters in length.

Facility Status Sheet

FORM SUBMITTED:
BY: ____________
DATE: ___/___/___ (M D Y)

A. EPA ID: |__|__|__|__|__|__|__|__|__|__|__|__|
FACILITY NAME: ________________________________

A1. Entry type: ☐ New ☐ Update
A2. Facility type: ☐ Major ☐ Non-major

1. GROUNDWATER MONITORING
Status:
1A. ☐ Detection (Go on to 2) ☐ Assessment (Go on to 2) ☐ Waiver (Skip to 6) ☐ NA (Skip to 8)

	EVALUATED?	ADEQUATE?	
2. Groundwater Monitoring Well System:	2A. ☐ NE Date ___/___/___ (M D Y)	2B. ☐ Yes ☐ No	
3. Groundwater Sampling, Analysis and Evaluation Program:	3A. ☐ NE Date ___/___/___ (M D Y)	3B. ☐ Yes ☐ No	
4. Notice of Significant Increase in Indicator Concentrations:			4. Submitted? ☐ No ___/___/___ (M D Y)
5. Groundwater Quality Assessment Report:			5A. Submitted? ☐ No ___/___/___ (M D Y)
	5B. ☐ NE Date ___/___/___ (M D Y)	5C. ☐ Yes ☐ No	5D. Showed hazardous constituents in ground water? ☐ Yes ☐ No
6. Waiver Demonstration:	6A. ☐ NE Date ___/___/___ (M D Y)	6B. ☐ Yes ☐ No	
7. Groundwater Monitoring Records:	7A. ☐ NA ☐ NE Date ___/___/___ (M D Y)	7B. ☐ Yes ☐ No	
8. Activities Subject to CLOSURE/POSTCLOSURE:	☐ Landfill ☐ Surface Impoundment ☐ Land Treatment/Application	☐ Incinerator ☐ Waste Pile ☐ Other (Specify) ________	

11/7/83

	EVALUATED?	ADEQUATE?	
9. Closure Plan:	9A. ☐ NA ☐ NE Date ___/___/___ M D Y	9B. ☐ Yes ☐ No	
10. Closure Cost Estimate:	10A. ☐ NA ☐ NE Date ___/___/___ M D Y	10B. ☐ Yes ☐ No	10C. Amount: $ ________ Unknown: ☐
11. Closure Assurance Instrument(s):	11A. ☐ NA ☐ NE Date ___/___/___ M D Y	11B. ☐ Yes ☐ No	
	11C. Instrument type(s): ☐ Trust Fund ☐ Financial Bond ☐ Performance Bond ☐ Letter of Credit ☐ Insurance ☐ Financial Test ☐ Corporate Guarantee ☐ State Guarantee ☐ Other State Mechanism		
12. Post-closure Plan:	12A. ☐ NA ☐ NE Date ___/___/___ M D Y	12B. ☐ Yes ☐ No	
13. Post-closure Cost Estimate:	13A. ☐ NA ☐ NE Date ___/___/___ M D Y	13B. ☐ Yes ☐ No	13C. Amount: $ ________ Unknown: ☐
14. Post-closure Assurance Instrument(s):	14A. ☐ NA ☐ NE Date ___/___/___ M D Y	14B. ☐ Yes ☐ No	
	14C. Instrument type(s): ☐ Trust Fund ☐ Financial Bond ☐ Performance Bond ☐ Letter of Credit ☐ Insurance ☐ Financial Test ☐ Corporate Guarantee ☐ State Guarantee ☐ Other State Mechanism		
15. Sudden Liability Instrument(s):	15A. ☐ NA ☐ NE Date ___/___/___ M D Y	15B. ☐ Yes ☐ No	15C. Amount? $ ________ per occurrence $ ________ annual aggregate
	15D. Instrument type(s) ☐ Insurance Policy ☐ Financial Test ☐ State Guarantee ☐ Other State Mechanism		
16. Non-sudden Liability Instrument(s):	16A. ☐ NA ☐ NE Date ___/___/___ M D Y	16B. ☐ Yes ☐ No	16C. Amount? $ ________ per occurrence $ ________ annual aggregate
	16D. Instrument type(s): ☐ Insurance Policy ☐ Financial Test ☐ State Guarantee ☐ Other State Mechanism		

17. Closure Process:	17A. Process begun?	☐ No	Date Begun __/__/__ M D Y
	17B. In accordance with approved plan and required procedures?	☐ Yes ☐ No	
	17C. Closure certifications received?	☐ No	Date Received __/__/__ M D Y
	17D. Facility released from closure assurance and liability requirements?	☐ NA ☐ No	Date Released __/__/__ M D Y
18. Post-Closure Process:	18A. Process begun?	☐ No	Date Begun __/__/__ M D Y
	18B In accordance with approved plan and required procedures?	☐ Yes ☐ No	
	18C. Survey plat/record of wastes received?	☐ No	Date Received __/__/__ M D Y
	18D. Post-closure period completed?	☐ No	Date Completed __/__/__ M D Y
	18E. Facility released from post-closure assurance requirements?	☐ NA ☐ No	Date Released __/__/__ M D Y
19. Permit Application:	19A. Called In?	☐ No	Date Called __/__/__ M D Y
	19B. Reason for permit application call-in: ☐ Groundwater ☐ Financial Assurance ☐ Closure ☐ Liability Coverage ☐ Other		
20. Comments:			

Kenk

Post Office Box 2063
Harrisburg, Pennsylvania 17120

SEP 28 1984

(717) 787-2814

RECEIVED
Director's Office
OCT 5 1984
Solid Waste Management

Mr. Thomas P. Eichler
Regional Administrator
U.S. Environmental Protection Agency
Sixth and Walnut Streets
Philadelphia, PA 19106

Dear Mr. Eichler:

Enclosed is my signed copy of the finalized State/EPA Enforcement Agreement. Please note that there are some minor revisions noted in ink in Attachments [illegible] and C. These revisions have been discussed with Jim Burke.

We appreciate Jim's efforts in putting this agreement together. Its implementation is a priority for our Environmental Protection programs.

Thank you for your efforts.

Sincerely,

Nicholas DeBenedictis
Secretary
Department of Environmental Resources

Enclosure

RAB:vlm

cc: Sec. DeBenedictis
Brandon
Dorchuni
Lazarchik
Hambright
Kefford
E. P. File

Enforcement Agreement
Between the
Commonwealth of Pennsylvania
and
the United States Environmental Protection Agency, Region III

Introduction

The purpose of this Agreement is to establish a more effective enforcement partnership between the Commonwealth of Pennsylvania and EPA Region III. This Agreement recognizes that achieving compliance with environmental statutes and regulations is a primary goal for both EPA and the State. The State has primary responsibility for taking timely and appropriate actions to ensure that compliance is achieved in programs that have been authorized or delegated to the State. EPA will provide the necessary policy guidance, technical and management support to assist the State in meeting this responsibility. EPA has ultimate responsibility for ensuring compliance with Federal environmental laws and ensuring that there is National consistency in providing timely and appropriate enforcement of these laws.

To ensure the most effective use of both State and Federal resources in achieving high rates of compliance, both parties agree that it is necessary to establish clear oversight criteria to guide and assess State compliance and enforcement program performance; clear criteria for direct Federal intervention with procedures for advance consultation and notification; and adequate State reporting to ensure effective oversight. Both parties commit to the goals established herein in an effort to enhance State/Federal enforcement efforts during FY '85.

The Agreement will focus on the following five areas for FY '85.

1. Establishment of Overall Enforcement Goals

2. Timely and Adequate Enforcement Action

3. State/EPA Communications

4. Reporting State Data to EPA

5. Areas of Special Emphasis

The Agreement is designed to provide an umbrella over the media-specific grant agreements and to establish over-arching goals that will guide State and Federal officials in administering the various environmental laws.

I. Establishment of Overall Enforcement Goals

The principal objective of the State/EPA enforcement efforts is to achieve an improved environment through increased compliance with environmental laws. This will be done in each program by the adoption of two concepts:

A. Identifying and enforcing in a timely manner against facilities in significant non-compliance with the objective of bringing each facility into physical compliance or ensuring that the facility is put on an enforceable schedule to achieve compliance at the earliest possible date (and where appropriate to include penalties to recover savings from non-compliance and to deter future violations).

B. Measure overall success by improving compliance rates in each program. For each media a list of significant non-complying facilities will be developed by the Regional Office using National criteria. This list will be coordinated with the State.

II. Timely and Appropriate Enforcement Actions

The State and EPA will act to ensure that timely and adequate action is taken as summarized in attachment(s) "A" . EPA policy and guidance on this subject is contained in "Policy Framework for State/Federal Enforcement Agreements" (June 8, 1984) and the following documents.

1. Air: Guidance on "Timely and Appropriate" EPA/State Enforcement Response for Significant Air Violators (June 28, 1984)
2. Water: Guidance for Oversight of NPDES Programs (July 13, 1984)
3. Hazardous Waste: Interim National Criteria for a Quality Hazardous Waste Management Program under RCRA (May 25, 1984)

In general, the State and EPA recognize the need for emphasizing formal enforcement actions (i.e., administrative orders, complaints and civil referrals) within established time frames, with expeditous compliance schedules, and penalties sufficient to negate any economic gain by non-compliance and deter future violations. Additionally, the State and EPA recognizes the importance of the timely issuance or reissuance of environmental permits (i.e., RCRA and NPDES) as an important part of an overall enforcement strategy. The State is primarily responsible for acting within the guidance set forth in the above documents. EPA will use these documents to determine situations which warrant direct Federal actions or intervention. Such actions will be undertaken only after appropriate State/EPA discussions.

In general, in situations where the State does not take timely and appropriate action, EPA will take direct actions against those facilities which are significant non-compliers and/or have violations that:

- o are causing actual harm or an imminent threat of harm to public health or the environment, or
- o are chronic violators, or
- o have realized a substantial economic benefit as a result of non-compliance.

In some ca. it may be beneficial for the Commonwealth to request direct Federal e. .cement. EPA agrees to assist the State in such instances to the .aximum extent possible. EPA and the State shall provide each other technical assistance in developing and enforcing cases.

III. State/EPA Communications

EPA and the State agree to discuss the status of specific significant non-compliance situations and major issues in each environmental program on an ongoing basis at staff level and with the State Director or his designee(s)* at a minimum of once per quarter. The conference calls or meetings shall take place between EPA Branch Chiefs or Division Directors and their State counterparts. The State and EPA will exchange high priority referrals, administrative actions, and schedules for taking these actions during these meetings. At the time that EPA sends any NOV/order/referral in a delegated program, the State will be notified. .hment "B" .... the name and phone number of the primary .rcement contacts in EPA and the States.

.he State and EPA will exchange high priority referrals and .dministrative actions during these meetings.

Where differences regarding overall enforcement issues or if specific cases cannot be resolved through established normal operating procedures, the State and EPA will escalate these issues in a timely fashion to the .ext highest level of management. If needed, issues will be elevated to the EPA Regional Administrator and the State Secretary. It is anticipated th.t the frequent communications specified above will negate the need . use of this escalation procedure except in unusual situations.

. Reporting State Data to EPA

... State is responsible for reporting sufficient and timely information to support EPA oversight. EPA is responsible for ensuring consistency on a National basis and has identified specific reporting requirements by which the State will report. These requirements will be specified in each State program grant and are summarized in attachment "C".

V. Areas of Special Emphasis

A. Chesapeake Bay

The State and EPA will continue to place special emphasis to any non-compliance that has the potential to impact the Chesapeake Bay. This includes additional priorities being placed on inspections and timely enforcement.

B. Federal Facilities

The State and EPA will give priority to permitting and compliance activities relating to Federal Facilities. The State will issue or reissue major and significant NPDES permits and assist in inspections of Federal Facilities. The State and EPA will exchange copies of all inspection reports and compliance/enforcement actions regarding Federal Facilities.

*State designees will be responsible for keeping the State Director informed of the case status discussions with EPA.

C. Innovative Inspections

The State and EPA will review the existing process for selecting inspections at the State and Federal level and determine how best to improve the government's enforcement effectiveness through innovative use of State/Federal inspection and enforcement resources. The EPA ESD Director and the State Designee will report their findings to the State Director and EPA Regional Administrator by January 15, 1985.

D. Municipal Policy

The State agrees to implement the National Municipal Policy as an initiative to achieve municipal compliance with the statutory deadline of July 1, 1988. The State strategy approved by EPA Region III on (date added later) is to be used as a basis of this commitment.

E. Hazardous Waste Compliance

The State & EPA agree that special emphasis will continue to be given to facilities in violations of closure/post closure and groundwater requirements.

** In the Event of Reversion of Phase I Interim Authorization **

F. In the event that the State Phase I Interim Authorized Program revert back to EPA during FY 85, Federal hazardous waste regulations will be fully enforceable in the State by EPA. EPA recognizes the need for Pennsylvania to enforce State hazardous waste regulations and will work cooperatively with the State to coordinate enforcement actions wherever possible. Specific responsibilities will be defined in a Cooperative Agreement to be signed by EPA & the Commonwealth.

This Agreement will remain in effect from October 1, 1984 until September 30, 1985. The Regional Administrator and the State Secretary will review this document at mid-year to determine any changes that may be needed. Nothing agreed to in this document should be construed to, in any way, limit the respective Agencies in the authorities and responsibilities in enforcing their environmental laws.

Signed, on ______________________________

Thomas P. Eichler Regional Administrator Enviromental Protection Agency	Nicholas DeBenedictis Secretary, PA DER Commonwealth of Pennsylvania

Attachment "A"

Summary of Timely and Appropriate State/EPA Enforcement Responses for Significant Air Pollution Violators

Day	State Response	EPA Response
0	Violation detected by state	
30	Violation confirmed*; evaluate enforcement options	Monitor state progress through monthly conference call
75	Issue NOV to violating source	Monitor state progress through monthly conference call
120		Monitor state action; if not timely or appropriate 1. call state; 2. issue section 114 letter; or 3. contact source regarding; or Federal action; or 4. issue NOV per state request
150	Achieve one of the following: 1. source compliance; or 2. legally enforceable administrative or judicial order with appropriate penalty in accordance with 6/28/84 policy; or 3. scheduled a state hearing for SIP revision 4. subject to referral to legal counsel office for appropriate civil, criminal, or administrative relief	Monitor appropriate state action through monthly conference call; or for inappropriate or untimely state action 1. call state 2. issue NOV
270	As appropriate; 1. continue monitoring compliance schedules 2. complete SIP revision	As appropriate; 1. monitor state SIP or enforcement actions 2. for EPA lead, achieve one of the following a. source compliance **b. section 120 action **c. judicial referral **d. compliance schedule

*This 30 day period may be extended if additional analyses or stack sampling is required to confirm the violation.
**Notify state.

Summary of Timely and Appropriate State/EPA Enforcement Response for Significant Water (NPDES) Violators

Day	State Response	EPA Response
0	Violation detected by state*	
30	Evaluate enforcement options; determine appropriate response	Monitor state progress through monthly conference calls
60	Document phone conversation, issue NOV or administrative order to violating source per Enforcement Response Guidance	Monitor state progress through monthly conference calls
90-120		Monitor state progress through monthly conference calls/review of QNCR; if not timely or appropriate 1. call state; 2. issue NOV; or 3. issue NOV/Order per state request
180	Achieve one of the following: 1. source compliance, or 2. legally enforceable administrative or judicial order with appropriate penalty 3. referral to legal counsel for appropriate civil, criminal or administrative relief	Monitor State action; if not timely or appropriate 1. call state; **2. issue administrator order, or **3. refer case
	As appropriate; 1. monitor compliance schedules 2. file case	As appropriate; 1. monitor state enforcement action 2. follow-up EPA action

*All DMRs to be reviewed within 30 days of receipt.
**Notify state.

For states with administrative penalty authority

Summary of Timely and Appropriate State/EPA Enforcement Response for High Priority RCRA Violators*

Day	State Response	EPA Response
0	Violation discovered** document in monthly enforcement log to EPA	Monitor state progress by 1. review enforcement log 2. conference calls
90	Issue Administrative Order with compliance schedule and appropriate penalty or refer to EPA for action	1. monitor state action; or 2. if not timely or appropriate a. call state; b. issue administrative order with schedule and penalty; or ***c. issue administrative order with penalty only; or ***d. refer case
	As appropriate 1. monitor compliance schedule; and 2. For violation of compliance schedule a. come into compliance within 30 days of violation of compliance schedule; or b. refer violations to legal counsel or judicial authority within 120 days of violation of compliance schedule in order; and 3. file case within 60 days of referral to legal counsel	Monitor state action; if not timely or appropriate, take action as stated above

*High Priority RCRA Violators are defined in EPA's Enforcement Response Policy.
**Policy requires that all inspection reports be reviewed within 45 days after the inspection.
***Notify state.

Summary of Timely and Appropriate State/EPA Enforcement Response for Class I Violators*

Day	State Response	EPA Response
0	Class I violation discovered**; document in monthly enforcement log to EPA	Monitor state progress by 1. review enforcement log 2. conference calls
30	Issue warning letter or NOV***; Monitor compliance status	1. monitor state action; or 2. if not timely or appropriate a. call state; ****b. issue NOV or administrative order
120	Review compliance status; determine need for formal enforcement action	Monitor state action through conference calls and review of enforcement log
180	Achieve one of the following: 1. compliance with NOV 2. issue legally enforceable administrative order ~~with~~ and where appropriate assess civil penalty; 3. civil equity relief action; or 4. summary criminal action	1. monitor state action; or 2. if not timely or appropriate a. call state; ****b. issue order with schedule and penalty; or c. refer case
	As appropriate: 1. monitor compliance schedule; and 2. For violations of compliance schedule a. come into compliance within 30 days of violation of compliance schedule; or b. refer and discuss violations with legal counsel within 120 days of violation of compliance schedule; and 3. File case or pursue appropriate administrative enforcement action within 60 days of referral to legal counsel's office	Monitor state action; or if not timely or appropriate take action as stated above

*Class I Violators are defined in EPA's Enforcement Response Policy.
**Policy requires that all inspection reports be reviewed within 45 days after the inspection.
***NOV should contain specific milestone dates.
****Notify state.

Attachment "B"

Primary Enforcement Contacts

	State Contact	EPA Contact
Air Programs	William Thompson 717-787-2688	Tom Maslany 215-597-3989
Water Programs	Cedric Karper 717-787-2666	Joe Galda 215-597-9078
Hazardous Wastes	James Snyder 717-787-9871	Bruce Smith 215-597-8175

Attachment "C"

NPDES Routine Reporting Requirements

1. Timely submission of the Quarterly Noncompliance Report. Report due dates as follows:

First Reporting Period:	July 1 - September 30; Due November 30
Second Reporting Period:	October 1 - December 30; Due February 28
Third Reporting Period:	January 1 - March 30; Due May 31
Fourth Reporting Period:	April 1 - June 30; Due August 31

The report is to be prepared in accordance with regulations and include an indication of those violations which meet proposed Significant Noncompliance (SNC) criteria. EPA & DER will cooperatively determine cases in SNC.

2. Submit a monthly listing of NPDES enforcement actions taken by the State. The list should indicate the permit name and number and type of action taken. A monthly summary report should be submitted with the list indicating the number of Criminal, Civil ($ fines assessed), Administrative, and Noncompliance Notices issued.

Due to be submitted by the ~~15th~~ 30th day after the end of the month.

3. Submit an exception list of all Permittees in Significant Noncompliance (SNC) for the same violations for two consecutive QNCRs which have not been addressed through enforcement or brought into compliance.

Due to be submitted ~~with~~ 30 days after the QNCR in Item 1 above.

4. Provide POTW permit compliance status (major and minor) of completed P.L. 92-500 Construction Grant projects.

Due to be submitted with the QNCR in Item 1 above.

5. Cooperate with EPA to ensure timely update of permit status in the National Permit Compliance System.

Due - On-going Responsibility. The State should also submit a permit issuance progress report by the 15th day after the end of a quarter.

6. Provide listing of pretreatment program approvals (if delegated).

Due to be submitted by the 15th day after the end of a quart4er.

7. Provide National Municipal Policy update on implementation of the approved State Strategy. The report should indicate the permit name, and number of Municipal Compliance Plans (MCPs), and Composite Correction Plans (CCPs) requested, received, and approved.

Due to be submitted by the ~~15th~~ 30th day after the end of a quarter.

8. Provide status report on any additional delegation proposals.

Due to be submitted by the 15th day after the end of a quarter.

9. Submit a listing of State NPDES inspections completed indicating the name, number, type, and date of inspection. A summary report is to be submitted with the list.

Due to be submitted by the ~~15~~30th day after the end of a quarter.

10. For Chesapeake Bay States only - A special report for Bay permittees on those activities in Items 2, 3, 4, 5, 6, and 8 to show progress in meeting Chesapeake Bay Program commitments. Due to be submitted the 30th day after the end of a quarter.

§ 105 GRANTS

The following activities are to be in the FY'85 § 105 grant application as minimum requirements needed for an effective State air enforcement program. Please indicate the activities you are committing to conduct.

1. Perform compliance inspections at all NSPS, NESHAP, and class A1 and A2 sources at least once a year. These sources shall be reviewed for compliance with all applicable regulations (i.e. SIP, NSPS, NESHAP, PSD, NSR). OK

2. Report monthly, 30 days after the end of the month, the dates and results of the inspections required by paragraph one above.

3. Take appropriate action on all missed increments of progress and emission standard violations at A1, A2, and NSPS sources within 30 days after becoming aware of the violation. In the case of emission standard violations at NESHAP sources, the State will take appropriate action within 5 days. Copies of reports documenting violations will be submitted to EPA monthly.

4. Take appropriate action on A1 and A2 sources in non-attainment areas and all NSPS and PSD sources in accordance with the June 28, 1984 guidance entitled: "'Timely and Appropriate' EPA/State Enforcement Response for Significant Air Violators". Submit 30 days after the beginning of the fiscal year a list of those sources considered significant violators in the State.

5. Submit copies of all "Notices of Violations", enforcement orders, decrees and variances issued by the State to A1, A2, NSPS, and NESHAP sources. These documents will be submitted to EPA monthly.

6. Submit monthly, a list of all A1, A2, NSPS, and NESHAP violating sources that have been referred to the State courts along with the results of such action.

7. Submit a copy of all new source permits for all A1 and A2 sources monthly.

Comply with all regulations implementing the requirements of § 172 of the Clean Air Act (referring to non-attainment areas) when issuing permits to new, modified, or reconstructed sources.

Ensure that all visible emission observations are conducted by personnel who are certified as visible emission observers in accordance with Method 9, 40 C.F.R. Part 60, Appendix A, no more than six months prior to the inspection date.

Notify EPA within five days after discovering that a source has commenced construction, modification, or reconstruction prior to receiving any required new source permits, including PSD permits.

1. Require each A1, A2, NSPS, and NESHAP source to submit one copy of each stack emission compliance test report to EPA concurrently with its submission to the State. Emission test reports written by the State will be submitted to EPA at least monthly.

2. Within one month after the beginning of FY'85, the State shall send an updated list of all NSPS sources which are required to install CEMs. This list shall include a description of the process required to be monitored, the applicable NSPS regulation, and the monitor(s) required to be installed.

3. Verify by the end of the first quarter that NSPS sources required to install CEMs are submitting quarterly excess emission reports (EERs) to the State.

4. Within 60 days of the end of each quarter, submit a summarized analysis of the source-supplied EER in accordance with EPA guidance.

5. Perform audits on all gaseous and opacity CEMs which are required by NSPS regulations.

6. Establish internal guidance documents for initiating enforcement actions in response to this data and for tracking this data. Submit a draft of this document by the end of the second quarter.

17. Develop and implement a strategy to ensure 100% compliance with the NESHAP regulations at asbestos/renovation projects including location of non-notifiers consistent with the guidance contained in the Asbestos Strategy Document.

18. For asbestos renovation/demolition projects provide verbal or written monthly status reports to EPA indicating the total number of notifications received, total number of inspections vs. number of different project sites, total number of violations found vs. number of different project sites, status of actions taken to resolve recently found and previous violations, and the date(s) that final compliance has been achieved.

19. Identify all fugitive benzene sources along with the source data, as detailed in the June 1, 1984 guidance entitled: "Benzene NESHAP Guidance", and submit a report on each source to EPA by the end of the first quarter. Any changes to the information should be updated on a quarterly basis and submitted to EPA no later than 30 days after the end of each quarter.

20. Provide, upon request from EPA, copies of any inspection reports, orders, test results, samples or other information which may be used in enforcement proceedings.

21. All documents submitted in accordance with the above activities shall be sent to the attention of the Air Enforcement Branch (3AM20).

NOTE: Underlinings indicate items which have been changed or added from previous years.

FY-1985 RCRA
Reporting Requirements

Report Name	Frequency/Due Dates
Compliance and Enforcement:	
A. Major Facilities Status Sheet	Initial Report - Nov. 20, 1984 (If not previously submitted) Monthly (updates as necessary) on the 20th
B. Hazardous Waste Compliance Monitoring and Enforcement Logs shall be completed properly and submitted to EPA by the 20th of each month for the preceding month with the associated inspection reports and enforcement actions.	Monthly on the 20th

These reports shall be submitted for:

(1) All inspections and reports associated with High Priority Class I and other Class I violations.

(2) All record reviews. EPA may request additional information based on its review of these logs.

(3) Facilities receiving permits in FY-1984.

(4) Facilities which will have their Part B's called in during FY-1985.

(5) Facilities receiving permits in FY-1985.

(6) Facilities which will close during FY-1985.

(7) Facilities which closed during FY-1984 which did not receive a follow-up inspection.

C. The State will update the Compliance Monitoring and Inspection Commitment Chart and submit it to EPA.	By January 20, April 20, July 20, and October 20, 1985

D.	State shall supply EPA with copies of all major facility inspection reports and results from any sampling inspections. Inspection reports and sample results for any non-major handlers with Class I violations shall also be supplied.	Monthly on the 20th
E.	Copies of all enforcement actions for High Priority and other Class I violations, including those at Department of Defense facilities, should be submitted monthly.	

I. Permitting:

A.	Permit Milestone Chart 1/	Monthly on the 20th
B.	Permit Status Report 2/	Initial Report (If not previously submitted) Nov. 20, 1984 Monthly (updates as necessary) on the 20th
C.	State's Compliance with Financial Assurance Requirements form on the status of the financial documents (Closure/post-closure and liability) for each interim status facility 1/	Interim Report due November 30, 1984. Final Report due July 15, 1985

II. General:

Major Facilities List (Official annual update)	May 30, 1985

1/ Copy attached

2/ States will use the Status of Permit Application sheet until the revised Permit Status report is received from EPA.

ATTACHMENT G

Commonwealth of Pennsylvania
Environmental Resources

August, 1983

1983 SEP -6 AM 11:51

SOUTHWESTERN REGION

Office of Chief Counsel/Environmental Protection
Enforcement Policy and Procedures

ENVIRONMENTAL PROTECTION AND
OFFICE OF CHIEF COUNSEL STAFF

R. HARRY BITTLE
Deputy Secretary for
Environmental Protection

DOUGLAS R. BLAZEY
Chief Counsel

This memo supersedes the August 27, 1980 Enforcement Policy and Procedure. It sets forth policy and procedure for the handling and coordination of enforcement cases between the various programs of the Office of Environmental Protection and the Office of Chief Counsel. Its purpose is to promote uniformity among regions and programs in handling enforcement actions with the realization that the department has limited resources and many mandatory responsibilities. It is not intended to affect current policies concerning the need for approval of various actions by the Secretary or the General Counsel. This policy and procedure is not intended to replace or limit the exercise of good judgment in meeting explicit statutory obligations.

I. POLICY

A. Enforcement Objectives - Each Environmental Protection Bureau and Regional Office is required to prepare annual program plans which contain specific goals and objectives. When such goals or objectives contain specific enforcement objectives, strategies or procedures it is necessary that the Office of Chief Counsel be consulted as to the legality, legal practicality and availability of legal staff time for such objective strategies and/or procedures. The Office of Chief Counsel may also propose enforcement objectives for the various programs.

B. Case Priorities - Cases will be handled by the attorneys in the Office of Chief Counsel on the basis of priority listing as agreed upon between the applicable Office of Environmental Protection and legal personnel. Enforcement priorities will be set in consideration of the enforcement objectives for the particular region, special program funding and other relevant factors, such as emergencies, health and safety, unusual public interest or exposure, etc. Efforts will be made to direct attorney time to those cases within the scope of the current enforcement objectives.

C. Counseling - Routine counseling between the field attorney and the various offices must be provided on a regular basis. Each Regional Counsel Office will program a reasonable amount of time for consultative services. Counseling sessions can be used for general discussions of legal principles, approval of citations, discussion on negotiation strategy or other matters as the participants see fit. Attorneys are also available by phone to answer routine questions, but phone calls or other informal contacts shall not be used by Environmental Protection personnel or attorneys to circumvent agreed-upon priority cases, except in emergency situations where the Regional Environmental Protection Director and the Regional Chief Counsel agree. Where appropriate, questions of statewide applicability and questions of first impression should be referred to the Bureau of Regulatory Counsel.

D. Negotiations - Attorneys, when available, will participate in the negotiation of formal, legally binding agreements for compliance with violators whether or not such agreements involve civil penalties. In those cases where the formal legal negotiations are to be conducted by the technical staff without attorney representation, the program manager and litigation attorney will, whenever possible, agree in advance on the negotiation strategy. Classes of cases which do not require detailed attorney concurrence may be agreed upon by the Regional Chief Counsel and the Environmental Protection Regional Director, consistent with both Bureau policies. The technical staff will not deviate from the agreed upon negotiations strategy (without attorney concurrence), except that in unusual circumstances, when unanticipated new or additional evidence is presented during the meeting and the regional attorney has elected not to attend, the regional program manager has the authority to change the previously agreed-upon terms. The Regional Chief Counsel will promptly be informed of the circumstances and final decision.

E. Disagreement Resolution - In the event that there is disagreement between the Environmental Protection Regional Director or Program Manager and the Regional Chief Counsel with respect to enforcement objectives, the referral of a particular case, enforcement strategy, imposition or amount of civil penalty, etc., such disagreement shall be referred to the Office of Chief Counsel and the Office of Environmental Protection to resolve the problem. In the event of a disagreement between the Chief Counsel and the Deputy Secretary, the matter will be resolved by the Secretary.

F. Two or More Programs Involved - It is understood that where two or more programs are involved in the same case, the Environmental Protection Regional Director will act in lieu of individual regional program managers or will coordinate action by the programs. It is also understood that the regional program manager may assign responsibility for any of the above actions to program staff and that, in some cases, central office staff may act in lieu of the regional program manager.

G. Training - The Office of Chief Counsel is responsible, in conjunction with the training section of the Bureau of Personnel and the Office of Environmental Protection, for providing frequent training seminars for field personnel in the Office of Environmental Protection. These will be given annually. Where feasible, video taping will be employed. This training will, at a minimum, cover the following general areas:

1. Gathering, protecting and identifying legally admissible evidence and preparation for court or Environmental Hearing Board proceedings.

2. Criminal procedure and trial tactics in filing and prosecuting summary citations.

3. Constitutional principles; search and seizure; self-incrimination; double jeopardy; notice and due process.

4. Negotiation techniques and agreement drafting.

II. PROCEDURE

A. Prioritizing Cases

1. The Environmental Protection Regional Director will, if necessary, in consultation with the Environmental Protection program chiefs, establish priorities for the referral of cases for enforcement action in accordance with enforcement objectives, bureau policies, special program funding and other relevant considerations. Following the tentative establishment of the prioritized list, the Environmental Protection Regional Director shall consult with the Regional Chief Counsel for the purpose of finalizing the priority listing. The prioritized list will be reviewed with the Regional Chief Counsel who will assign attorney time to as many cases as staff resources permit and such cases shall be handled in order of established priorities. Efforts will be made to keep the list reasonably short. Such lists should be reviewed and updated (if necessary) at least every other month by the Environmental Protection Regional Director and the Regional Chief Counsel. Program staff will continue to work on and seek to obtain compliance consistent with these procedures for those cases not yet referred to the litigation office.

2. Once the priority list for enforcement of cases has been established, a case may be referred from the list to the Litigation Office for appropriate action upon agreement of both the Environmental Protection Regional Director and the Regional Chief Counsel. Once the case has been so referred, it shall be the responsibility of the Regional Chief Counsel to insure that adequate consultation is maintained with the appropriate program staff.

3. Emergency cases may be referred, accepted and acted upon without following the prioritization procedure called for in this document. Such emergency cases are those in which immediate legal action is needed to prevent serious threats to the environment or to the health, safety and welfare of the citizens, or other unusual cases, upon agreement of the Regional Chief Counsel and the Environmental Protection Regional Director.

4. It is recognized that each Regional Counsel Office serves more than one Regional Office. Inter-regional prioritization will not, generally, be conducted on any formal basis. Rather, the Regional Chief Counsel will, unless otherwise agreed, keep the attorney time devoted to each regional office at a level commensurate with the relative complexity, importance and number of cases generated by each office. A base line level of effort will, however, be maintained for each regional office such that the high priority cases in each office receive attention. If necessary, an inter-regional priority list will be developed by agreement of the parties concerned.

B. Criminal Actions

1. With regard to summary criminal actions, all such actions must be approved by attorneys in the Regional Litigation Office. The extent to which the proposed action will be reviewed will be determined by the Regional Chief Counsel. Attorneys will not, in the normal course, be available to represent the Department at hearings before district justices. Properly certified law students, when available, may be assigned by the Regional Chief Counsel to handle summary trials. If convictions pursuant to summary hearings are appealed, the county district attorney will be expected to represent the interest of the Commonwealth, except in unusual cases where the Regional Chief Counsel decides to assign a staff attorney with the concurrence of the county district attorney. Citations and private complaints submitted for approval must be accompanied by a brief written summary of events surrounding the case, unless, at the option of the Regional Chief Counsel, an oral recitation of the case by the Regional Program Manager or his designee is deemed sufficient.

2. Citations and private complaints will be acted on by the regional attorney within 7 work days after receipt. In the event the attorney fails to respond within this seven day period, the Environmental Protection Regional Director, if he determines that the action appears to be consistent with prior approved actions, and that no unusual facts or problems are involved, may authorize filing of the citation or a private complaint and shall advise the appropriate regional litigation office attorney of such filing. This procedure may be modified upon agreement between the Environmental Protection Regional Director and the Regional Chief Counsel.

3. Misdemeanor actions are subject to prioritization and referral as set forth in this document. If, however, such actions will be handled by the local District Attorney's Office, they may, at the option of the Regional Chief Counsel, be processed in the same manner as a summary action and, in that event, need not be placed on the priority list or referred. Under the Solid Waste Act, felony investigations and certain misdemeanor investigations with clear criminal intent should be referred to the Toxic Waste Investigation and Prosecution Unit.

C. Additional Procedures

In addition to the foregoing, the following procedures apply:

1. CONSENT ORDERS AND AGREEMENTS in which affirmative action by the regulatee is mandated and/or in which claims for penalties are settled will be signed both by the regional attorney and by the regional program manager unless, in some unusual circumstance agreed upon by both parties, such actions should be signed by the Governor, Secretary, Deputy Secretary, Regional Director, Bureau Director, etc. A regional attorney wll review COA's drafted by the program staff within 14 working days after receipt. If time constraints prevent such review, the Regional Chief Counsel will establish a time limit in consultation with the Regional Director.

2. ORDERS will be issued only after review by the appropriate attorney, unless an attorney cannot be contacted and the regional program manager agrees that an extreme public health or environmental hazard exists. If the attorney does not concur, the matter should be referred for disagreement resolution as set forth herein.

3. PERMITS will only be denied by the appropriate Environmental Protection person after the denial letter has received legal review by the regional attorney. Program personnel and the Regional Chief Counsel may agree, in writing, on categories of cases wherein permit denials may be issued without prior review by the regional attorney. Such actions will be acted on by the regional attorneys within seven work days after receipt provided that previous consultations regarding the case have occurred. In the event the attorney fails to respond within this seven day period, the Environmental Protection Regional Director, if he determines that the action appears to be consistent with prior approved actions, and that no unusual facts or problems are involved, may authorize such denial and shall advise the appropriate regional litigation office prior to issuance.

4. CERTIFICATIONS AND APPROVALS. Program managers and/or the Environmental Protection Regional Director and the Regional Chief Counsel will agree in writing on categories of cases wherein denials of Certifications and Approvals must have prior review by the regional attorney.

5. PERMITS, CERTIFICATIONS, AND APPROVALS may be issued without consultation with the regional attorney. If, in the judgement of the appropriate program personnel, it is anticipated that an appeal by the permittee or a third party is likely, or if the action involves unusual legal issues or an active case referred to the regional attorney, consultation of the appropriate attorney in the Bureau of Litigation shall be sought before the action is taken.

6. EQUITY ACTIONS will be filed by the regional attorney after review and approval by the regional program manger, the Litigation Coordinator, the Chief Counsel and the Deputy Secretary for Environmental Protection and the Secretary.

7. CIVIL PENALTY ACTIONS AND CIVIL PENALTY ASSESSMENT will be filed with the Environmental Hearing Board by the regional attorney after review and approval by the regional program manager, the Litigation Coordinator, the Chief Counsel, the Deputy Secretary for Environmental Protection and the Secretary.

8. NOTICES OF VIOLATION may be sent by program staff without consultation with the regional attorney, except that the attorney shall be consulted if the case has been referred previously to the regional attorney and is an active case or involves close questions of law.

D. <u>Drafting Documents</u>

Whenever possible, the program staff will prepare a first draft of proposed documents relating to the different types of action listed above, except that documents regarding legal action in court or before the Hearing Board will be drafted by attorneys.

E. <u>Outside Discussions</u>

Whenever a case has been referred to the regional attorney, program staff, other than program managers and above, will not discuss the case outside the Department, either orally or in writing, without prior concurrence of the regional attorney. All substantive contacts which are or may be germane to the case with companies in litigation shall be communicated to the regional attorney on the case. Such contacts and discussions without prior attorney approval wil be kept to a minimum, and no aspect of a referred case may be settled or compromised without joint Program and Litigation Office concurrence. The Regional Attorney on the case will not negotiate with, change the Department's position, or settle a case without the concurrence from the Regional Program Manager. Similarly, the Environmental Protection staff will not modify or waive the provisions of a COA without consulting with the appropriate attorney.

F. Telephone Counseling

Except as relates to cases which have been previously referred, telephone contacts with attorneys for counseling shall be kept to a minimum. To the degree possible, non-emergency inquiries of this type will be forwarded in writing, or reserved until the next counseling session.

CALCULATION OF ACT 97 SOLID WASTE CIVIL PENALTIES

Civil penalties are to be calculated using an assessment of the following factors:

I. Degree of severity of incident caused by the violation
II. Costs incurred by the Commonwealth
III. Savings to the violator
IV. Degree of willfulness
V. Promptness of reporting the incident
VI. Past history of violations
VII. Duration of the violation

The maximum statutory penalty for each offense for each separate day the violation persists is $25,000. The total penalty is calculated as follows:

Step I. - Degree of Severity

Since many aspects of an incident do not lend themselves to accurate monetary calculations, the following approach should be used to determine the relative severity of the incident. Use the criteria in Appendix A to determine the severity of the incident. Each incident should be ranked as SEVERE, MODERATE, or LOW. For example, if the incident causes any of the results listed in the severe column, the incident is usually considered to be SEVERE. The same approach applies to ranking an incident as MODERATE. Incidents which do not produce any of the listed results normally are considered to be of LOW severity.

That portion of the total penalty assessed on the basis of severity should be carefully decided after an objective consideration of all the factors involved, realizing that a number of the pertinent criteria do not lend themselves to the application of absolute monetary values (e.g., the destruction of an endangered species habitat). The portion of the total penalty assessed for severity should fall within the following ranges:

Severity	Minimum Amount	Maximum Amount
LOW	$ 1,000	$ 5,000
MODERATE	$ 5,000	$ 12,500
SEVERE	$12,500	$ 25,000

Step II. - Costs Incurred by the Commonwealth

Calculate all costs related to the investigation and abatement of the incident. Costs incurred by personnel from all Commonwealth agencies involved should be carefully recorded and should include the following:

1. abatement, remedial, and preventative measures performed
2. salaries and benefits
3. travel and expenses
4. legal staff costs
5. cost of contracts awarded to Commonwealth subcontractors
6. cost of sampling and laboratory analyses

That portion of the total penalty assessed for Commonwealth costs is the sum of the above expenditures and may vary greatly depending on the nature of the incident. It may actually exceed the maximum statutory penalty.

Step III. - Savings to the Violator

This amount is determined by calculating the costs, if any, of the actions that should have been taken by the violator, the omission of which directly or indirectly caused the incident to occur.

> Example: A severe erosion and sedimentation problem results from an operator's failure to construct surface water control ditches and swales as required in the permit. Calculate the savings resulting from the failure to construct, seed, mulch, and maintain the required structures.

Step IV. - Degree of Willfulness

The behavior of the violator should be carefully evaluated before, during, and after the incident and should be categorized as follows:

1. Willful Violation: a deliberate premeditated action with prior knowledge that the act constituted a violation of environmental statutes, regulations, etc., or a deliberate attempt to circumvent or avoid compliance with same.

2. Reckless Violation: a violation resulting from the disregard of an obvious risk, the existence, nature, and possible consequences of which were known, or of which prior warning had been given.

3. Negligent Violation: a violation resulting from the failure to recognize, correct, or prevent a condition which the violator should have recognized carried a certain degree of risk.

4. Accidental Violation: a violation resulting from factors beyond the control of the violator and, therefore, which could not reasonably have been prevented.

That portion of total penalty assessed for willfulness should be determined as follows:

Type of Violation	Minimum Penalty	Maximum Penalty
ACCIDENTAL	None	None
NEGLIGENT	$ 500	$ 5,000
RECKLESS	$ 5,000	$ 12,500
WILLFUL	$12,500	$ 25,000

Step V. - Promptness of Reporting of Incident

This criterion applies to those types of incidents for which a reporting requirement exists in the relevant statutes, regulations, or permit conditions (e.g., spill reporting requirements) or for those situations in which failure to report the incident would clearly constitute a negligent or reckless endangerment to the environment or the public health, safety,and welfare.

That portion of the total penalty to be assessed for failure to report the incident in a timely manner shall be determined by the length of the period of delay and any mitigating circumstances surrounding the failure to report. The minimum penalty, if applicable, shall be $500 and the maximum penalty shall be $2,500.

Step VI. - Past History of Violations

The total penalty calculated by adding those amounts obtained from Steps I through V above shall be increased by a factor of 5% for each prior violation occurring during the previous five (5) year period. For purposes of computing civil penalties, such violations shall include those resulting in any final adjudicated proceeding, consent order, agreement, consent decree, or civil penalty assessment. Violations occurring anywhere throughout the Commonwealth shall be considered.

Step VII. - Duration of Violation

Separate violations occurring on separate days are considered to be separate offenses for which civil penalties may be individually assessed. If violations occur over a number of days and collectively result in a single incident or pollution event which persists for a number of days, calculate the total penalty as follows:

A. Determine the total penalty assessable under Steps II, III, and V above for the entire incident or pollution event.

B. Determine the degree of severity of the incident for each day of violation and add these values. Note that the degree of severity may increase or decrease over time.

C. Determine the degree of willfulness of each separate violation and add these values.

D. Add the values from A, B, and C above and multiply by the past history of violation factor as described in Step VI.

APPENDIX A
CRITERIA FOR ASSESSING SEVERITY OF INCIDENT

	SEVERE		MODERATE
1.	Loss of service of public or private water supplies - contamination exceeding drinking water standards	1.	Significant contamination of public or private water supplies - not exceeding drinking water standards
2.	Contamination of groundwater sufficient to restrict present or potential future use, or contamination exceeding drinking water standards	2.	Measurable contamination of groundwater but not exceeding drinking water standards
3.	Major substrate (soil, streambed, etc.) contamination requiring excavation & removal, extensive treatment or neutralization, or long-term natural recovery	3.	Substrate contamination requiring short-term natural recovery
4.	Destruction, alteration, or contamination of critical habitat of endangered or threatened species	4.	
5.	Major fish or wildlife kill or destruction to natural vegetation	5.	Limited but significant fish or wildlife kill or destruction to natural vegetation
6.	Incident results in physical injury, illness or death of individuals	6.	Incident results in minor injury or illness of individuals
7.	Incident results in major damage to private, personal, or public property	7.	Incident results in moderate but significant damage to private, personal, or public propety
8.	Incident necessitates prolonged evacuation or evacuation over a comparatively large area	8.	Incident necessitates short-term evacuation or evacuation over a limited area
9.	Incident results in a major public nuisance (vectors, odors, smoke, etc.)	9.	Incident results in moderate but significant public nuisance
10.	Incident results in a severe or prolonged interruption of public transportation systems	10.	Incident results in significant but limited interruption of public transportation systems
11.	Incident results in major impact on land use (agriculture, silviculture, mineral extraction, recreation, future development, etc.)	11.	Incident results in significant but limited or short-term impact on land use

APPENDIX A (cont.)
CRITERIA FOR ASSESSING SEVERITY OF INCIDENT

SEVERE	MODERATE
12. Incident involves extremely dangerous wastes or large quantities of wastes	12. Incident involves moderately dangerous wastes or limited but significant quantities of wastes
13. The total calculable monetary damage and economic loss (including that from above and any other factors) exceeds $12,500. Do not include any direct Commonwealth expenditures.*	13. The total calculable damage is greater than $5,000, but less than $12,500.*

*Consider such factors as loss of fish and wildlife, loss of timber, loss of farm crops and stock, loss of mineral resources, increased costs for water treatment or alternate supply sources, evacuation costs, other emergency response costs (municipal, county, etc.), costs incurred by disruption to transportation systems, economic losses due to altered or restricted land and water uses, etc.

ER–SWM–10: Rev. 6/80

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

FORM NO. 4

DATE ____________________ I.D. # ____________________

☐ REQUEST FOR LEGAL ACTION

☐ LEGAL ACTION NOTIFICATION
(check appropriate)

TO: Bureau of Litigation, ____________ Region AND Chief, Division of Operations
Attorney (if assigned) ________________

FROM: ______________________________ Region ______________

ALLEGED VIOLATOR(S): (If Company or Municipality, list responsible officials.)
NAME(S) ______________________________

ADDRESS ______________________________

NATURE OF VIOLATION:
- ☐ Non-permitted site/illegal dumping
- ☐ Violation of Administrative Order
- ☐ Violation of Court Order/Mandamus Action
- ☐ Violation of Consent Order & Agreement
- ☐ Violation of Permit Conditions
- ☐ Violation of Rules and Regulations under:
  - ☐ Solid Waste Management Act
  - ☐ Clean Streams Law
  - ☐ Air Pollution Control Act

Other ____________________

DESCRIPTION OF VIOLATION:

LEGAL ACTION ☐ REQUESTED OR ☐ TAKEN (check one)
- ☐ Equity Action
- ☐ Mandamus Action
- ☐ Summary Action
- ☐ Enforcement Conference
- ☐ Stipulation Agreement
- ☐ Consent Order & Agreement
- ☐ Administrative Order
- ☐ Other ____________________

ADDITIONAL INFORMATION:

Is a search warrant required?	☐ YES	☐ NO
Notice of Violation sent? (If yes, attach copy.)	☐ YES	☐ NO
Chronological case history attached?	☐ YES	☐ NO
Draft order, citation, etc. attached?	☐ YES	☐ NO

Does this action involve the ☐ revocation ☐ suspension ☐ denial of permit? (check applicable)

SITE INFORMATION:

Location of violation: ____________________ (municipality), ____________________ (county)

Daily volume of waste going to the site: ____________________

Is there an alternate disposal site?	☐ YES	☐ NO
Does this case involve hazardous wastes?	☐ YES	☐ NO

Is this site ☐ active ☐ inactive ☐ abandoned
(Check Applicable)

PLEASE RESPOND WITHIN TEN (10) DAYS TO ____________________ (name title).

SNC-BOY

DER/Region I

SNC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
Bethlehem Steel Corp. PAD990824161	GWM	EPA issued a § 3008 complaint for failure to develop an GWQA Plan.	YES	YES	EPA	Company has agreed to relocate the monitoring wells which were improperly located thus resulting in meaningless GWM statistical analysis. A final order was projected for 3/30/85, but was delayed due to other priorities in ORC. New attorney has also been assigned.
Boyertown Sanitary Disposal Co. PAD048603005	Waste Disposal and leachate violations	DER Order w/Civil Penalty Assessment for waste disposal violations issued 6/84.	YES	YES	DER	DER/BSDA signed a Consent Order and Agreement 11/29/84 for waste disposal practices. All equipment is now in place and agreement has been reached with BMMA. FACILITY IS IN COMPLIANCE.
Philadelphia Coke Co. PAD000427906	GWM	DER issued NOV to facility 10/84 for lack of GWM system.	NO	NO	DER	GWM wells have been installed and initial background samples have been taken. FACILITY NOW IN COMPLIANCE.

)ER/Region II

:NC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
'avid Kahn, .nc. 'AD041520242	Closure/GWM	On 7/21/83 DER issued an order and on 8/1/83 EPA issued an § 3008 complaint for failure to develop and submit closure and GWM plans. DKI has since installed GWM wells and submitted a revised closure plan.	YES	YES	DER/EPA	A revised closure plan was submitted on 5/7/85. An approval letter was sent out on 6/28/85. FACILITY IS NOW IN COMPLIANCE.
yncott Corp. AD060506805	Closure/GWM	DER entered a stipulation of Parties Agreement as a result of a civil suit and collected a $90,000 penalty.	YES	YES	DER	Additional wells have been installed. The closure plan was approved by DER on 6/25/85. FACILITY IS NOW IN COMPLIANCE.
onolli Corp. AD073613663	Liquids in landfill	EPA issued a § 3008 complaint on 3/28/84. Final Order was executed on 5/3/85.	YES	YES	EPA	Final Order has been executed. Tonolli has agreed to pay a $25,000 penalty. Final compliance should be achieved by 9/15/85.
ew Jersey Inc Co. AD002395887	GWM/Operating without a permit	A DER NOV was issued on 12/13/83 for the lack of a GWM system. Escalated enforcement action could not be taken because of the lack of supporting evidence. EPA inspected on 7/24/84 to collect needed sampling evidence.	YES	YES	DER/EPA	A § 3008 complaint was issued on 6/14/85. DER has also prepared a draft order which is presently under legal review.

SNC-BOY

DER/Region III

SNC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
Lancaster Metals Science Corp. PAD082434747	GWM	DER issued an NOV in 12/84 for failure to implement a GWM system.	YES	YES	EPA	GWM system not installed. EPA has prepared § 3008(a) Complaint and this should be issued by ~~7/31/85~~. Aug.

DER/Region IV

NC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
merican Color and Chemical Corporation AD003047792	Closure	EPA issued an NOV on 6/21/84 for closure plan deficiencies.	NO	NO	DER	Additional sampling of waste in lagoons was conducted on 3/6/85 through 3/20/85. The Company results are expected back the week of 7/7/85. DER plans to meet with AC&C in July to compare the sampling results and discuss the treatability of the waste. Based upon these discussions a revised closure plan will be submitted. The closure plan should be finalized and approved by 9/30/85.
ethlehem teel Corp. AD003053758	Closure	Storage violations were addressed in a settlement agreement which included an assessment of $3500 penalty. EPA sent a § 3007 letter to help prod BSC on 3/22/85.	YES	NO	DER	DER has delisted waste being stored in several of the surface impoundments. A closure plan is being developed for two HW impoundments. DER has prepared a draft Consent Order calling for submittal of an acceptable closure plan.
TE Sylvania orporation AD003053758	Closure	Informal conference was held on 9/13/84 to discuss closure plan deficiencies. Revised closure plan has been submitted.	YES	Will be assessed in Settlement Agreement.	DER	Closure plan has been approved. FACILITY IS NOW IN COMPLIANCE. A Settlement Agreement has been prepared asking for a $10,000 penalty. This is presently being reviewed by the Office of Chief Counsel.

DER/Region V

SNC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
Kelly Run Sanitation PAD004810222	Closure	On 8/28/84 DER enforced a consent order to close facility.	YES	YES	DER	Facility has ceased operation and is undergoing extended closure/assessment.
Mill Service, Bulger PAD059087072	GWM	DER issued an NOV on 5/84 to initiate GWQAP.	YES	NO	DER	GWM wells for assessment recently installed. FACILITY NOW IN COMPLIANCE.
Babcock & Wilcox PAD000651752	GWM	In 2/84 EPA issued a § 3008 Complaint.	YES	YES	EPA	EPA was to issue final order by 3/31/85, but this has been delayed due to other priorities in ORC. Assigned to new attorney.
Bethlehem Steel Corp. (Johnstown) ?AD004344222	GWM	In 3/84 EPA issued a § 3008 Complaint.	YES	YES	EPA	EPA was to issue final order by 3/31/85, but this has been delayed due to other priorities in ORC. Assigned to new attorney.
4unicipal & Industrial)isposal Co., Inc. ?AD000436014	Closure	In litigation w/DER	YES	YES	DER	EPA issued a separate complaint for failure to monitor GW on February 28. Hearing scheduled for 8/7/85.
3reslube-'enn, Inc. 'AD089667695	Closure	None	YES	YES	DER	DER issued a cease and desist order with penalties on 12/21/84.
J.S. Steel :orp. - South 'aylor Land-	GWM	In 6/84 EPA issued a § 3008 Complaint.	YES	YES	EPA	EPA to issue final order by 7/30/85. Assigned to new attorney.

DER/Region VI

SNC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
Witco Chem Butler PAD004388500	GWM	DER issued an NOV on 11/1/84.	YES	NO	DER	DER issued Order 5/10/85 for [illegible] — GWM still [illegible] to be [illegible]
Vogel Disp. Butler PAD005820691	GWM	None	YES		EPA	DER issued an Order on 5/29/85. GWM plan required and specifics agreed to by facility.
Sharon Steel Sharon PAD001933175	GWM	On 6/27/84 EPA issued a § 3008 Complaint.	YES	YES	EPA	EPA to issue Final Order by 7/30/85. DER to check on old WQ well approvals.

DER/Region I

SNC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
Naval Air Development Center PA6170024545	GWM	DER NOV was issued in 10/83 for lack of gwm system. EPA issued a compliance demand on 2/28/85.	NO	NO	EPA	Additional well was installed. FACILITY IS NOW IN COMPLIANCE.
Uniform Tubes PAD002344463	GWM	EPA issued § 3008 Compliance Complaint 3/5/85.	YES	YES	EPA	Wells have been installed. FACILITY IS NOW IN COMPLIANCE.
National Rolling Mills PAD002324978	GWM	In 10/83 DER issued an NOV for failure to sample for RCRA parameters. In 1/84 DER issued an NOV for failure to submit Closure Plan.	YES	NO	DER	Wells have been installed. FACILITY IS NOW IN COMPLIANCE.
Stauffer Chemical Co. PAD002336410	GWM	DER issued an NOV in 10/83, but facility is still not sampling for appropriate parameters. If no hazardous waste remains in the lagoon, it is not subject to RCRA regulations.	NO	NO	DER	Data submitted to demonstrate that no hazardous waste remains in lagoon is insufficient. A letter was sent to the company on 3/22/85 requesting additional sampling at the lagoon. Company has submitted a sampling plan to EPA for review.
Carpenter Tech	GWM	No GWM wells, Company contends that their waste piles are not required to	NO	NO	DER/EPA	§ 3007 letter will be sent by 7/30/85 to clarify applicabi-

SNC-DYNAMIC

DER/Region I

SNC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
Brush Wellman PAD002387835	GWM/ Closure	NONE	YES	NO	EPA	EPA is negotiating consent agreement. Draft consent agreement should be prepared and sent to company by 9/30/85.
Boeing Vertol PAD096837356	GWM	NONE	YES	NO	DER	IN COMPLIANCE.
Ametek - U.S. Guage PAD002342236	GWM	NONE	YES	NO	DER	IN COMPLIANCE.
U.S. Steel PAD002375376	GWM	DER sent an informal request for a GWQA Plan on 2/12/85.	YES	NO	DER/EPA	USS submited GWM system evaluation and GWQA Plan on 4/1/85 to DER and EPA. Awaiting additional related information to complete review. Review should be completed by 7/30/85.

DER/Region II

SNC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
'obyhanna ırmy Depot 'A5213820892	Closure/ other generator violations	DER held an informal conference with Depot on Oct. 5, 1984, concerning generator violations. EPA called in closure plan via § 3007 letter on 11/12/84.	NO	NO	EPA	Issued Federal facility Complaint and Compliance Demand on 4/30/85. Draft Final Order has been prepared and should be executed by 8/15/85.
tlas Powder ompany \D071203046	Closure	Closure plan was called in via § 3007 letter on 11/13/84. An inspection was conducted on 11/7/84 and potential violations of illegal storage and disposal were discovered.	YES	YES	EPA	A § 3008 Order has been prepared and is presently under review by ORC. According to ESD sampling analysis QA/QC is not acceptable. Another sampling inspection has been scheduled for 8/20/85.
'Graw-Edison .D0003038411	GWM/ Operating without a permit	DER sampling inspection indicates Company is operating a surface impoundment without interim status or GWM.	YES	YES	DER	Consent Agreement is anticipated by 8/30/85.
I ericas, c.)000797928	Closure/ GWM	Operating open burn pit for detonation of explosive waste. No interim status, gwm, or closure plan for waste pile of ash (K044).	YES	YES	DER	DER plans to issue a Consent Order. An enforcement conference is scheduled for July 24, 1985 to discuss such an Order with ICI.

DER/Region II (Cont.)

SNC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
Keystone Chem PAD000647735	GWM	None	NO	NO	EPA	EPA GWM inspection scheduled for fourth quarter FY'85 to evaluate adequacy of GWM system.

DER/Region III

SNC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
Bethlehem Steel Steelton, PA PAD003026531	GWM	Electric arc furnance dust stored in waste pile without GWM.	YES	YES	DER/EPA	Draft Consent Order has been prepared and is under consideration by BSC. If BSC doesn't sign CO, DER will issue Administrative Order by 8/15/85.
Letterkenny Army Depot PA6213820503	GWM	No GWM wells. § 3007 letter sent on 6/13/85.	NO	NO	DER/EPA	DER has approved GWM plan. The wells will not be installed until Fall 1985 because of government contract procedures.

DER/Region IV

SNC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
Koppers Co. PAD056723265	Closure	Closure plan was called via § 3007 letter dated 11/9/84. Deficiencies were found.	NO	NO	EPA	NOV was issued on 2/8/85. Company subsequently submitted a revised closure plan which addresses the deficiencies. FACILITY IS NOW IN COMPLIANCE.

DER/Region V

SNC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
Alcoa Tech Center PAD004393138	GWM/ Closure	NONE	YES	YES	DER	DER Consent Order by 7/31/85.
Norwin Plating PAD051136984	GWM	Clean closure conducted. DER requiring the installation of one well to check GW quality.	NO	NO	DER	DER plans to install the monitoring well because of owner's financial hardship by the end of FY'85.

ER/Region VI

NC FACILITY	VIOLATION	PREVIOUS ENFORCEMENT ACTION	PENALTIES REQUIRED?	PENALTIES ASSESSED?	LEAD AGENCY	DESIRED ACTION
tackpole orporation AD063652820	GWM	Company has completed a GW assessment program. The program may not be adequate.	YES	NO	DER	DER has evaluated the Assessment Plan. DER is sending letter requiring additional information. This information should be received and reviewed by 5/31/85. Because hydrologist has been directed to work on permits, the review has not been done.
: - Erie \D005033055	GWM	Company has failed to go into assessment.	YES	NO	DER	Assessment Plan has been received and reviewed. DER is requiring additional work which should be completed by 5/30/85. DER hydrologist has not been able to evaluate because of priority given to permit review.
mco Inc. D004325254	GWM	None	NO	NO	DER	DER approved GWM plan. Company is installing wells.

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85
Region I - Norristown

Amchem Products Inc. PAD 00 234 8324 Ambler, PA	S02 T04 S02 S01 S02	39,700 Gal. 21,000 Gal. 19,400 Gal. 6,000 Gal. 9,700 Gal.	
American Nickeloid Co. PAD 00 239 9285 Cherry Street Walnutport, PA 18088	D83		G.W.
Ametek U.S. Guage Div. PAD 00 234 2236 Sellersville, PA	D83		G.W. Post Closure
Arco Petroleum Products Co. PAD 00 228 9700 3144 Passyunk Avenue Philadelphia, PA 19145	D81	13.5 Acre	G.W.
Baldwin Hardware Mfg. Corp. PAD 00 235 0833 841 Wyomissing Blvd. Reading, PA 19605	S04	26,000 Gals.	G.W.
Bethlehem Steel Corp. PAD 99 082 4161 Bethlehem, PA	SO1 SO3 D80 D83	2,200 Gal. 60,185 Cu/Yds. 16 Acre/Ft. 300,000 Gals.	G.W.
Boeing Vertol Company PAD 096 837 356 Philadelphia, PA	S03		G.W.
Boyertown Sanitary Disposal, Inc. PAD 04 603 005 300 Merkel Road Gilbertsville, PA	D80 T01 T02	810,000 Acre/Ft. 25,000 Gals/Day 37,500 Gals/Day	G.W. Commercial
Brush-Wellman Inc.-Shoemakersville PAD 00 238 7835 Shoemakersville Rd. Shoemakersville, PA 19555	S04 T02	3,250,000 Gals. 820,300 Gals/Day	
Cabot-Berylco Inc. (KBI Landfill) PAD 04 454 0136 Tuckerton Road Muhlenberg Twp., PA 19605	D80	1.8 Acre/Ft.	G.W.

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85

Region I - Norristown

Carpenter Technology Corporation PAD 00 234 4315 Reading, PA	S02 S01 S01 S03 S01 T01 T01 T01 T01 T04	5,000 Gal. 110 Gal. 110 Gal. 7,975 Cu/Yds. 5,500 Gal. 21,600 Gal/Day 216,000 Gal/Day 72,000 Gal/Day 1,800,000 Gal/Day 1,000 Gal/Day	
Chemclene Corp. PAD 01 435 3445 258 Phoenixville Pike Malvern, PA 19355	S01 S02	27,500 Gal. 10,000 Gal.	Commercial
Chem-Clear Inc. PAD 00 073 1026 Jeffrey St. & Delaware Ave. Chester, PA 19013	SO2 T01	100,000 Gals/Day	Commercial
Combustion Equipment Associates Inc. PAD 00 055 4638 Valley Forge, PA	S02 T04 S02	10,000 Gal. 7,000 Gal/Day 55,000 Gal.	
Conversion Systems, Inc. - Marcus Hook Fac. PAD 09 916 0906 10th Street Marcus Hook, PA 19061	SO2 T01		Commercial
Crompton & Knowles Corp.-Gibraltar Plt. PAD 00 291 7466 Route 724 Gibraltar Birdsboro, PA 19508	T02 T02 D83	320,000 Gals/Day 300,000 Gals/Day 7,600,000 Gals.	
Delaware Container Co., Inc. PAD 06 437 5470-PAAH0032 W. 11th Ave. & Valley Road Coatesville, PA 19320	T03	50 Gals/Hr.	Commercial
Gulf Oil Corporation-Phila. Ref. PAD 04 979 1098 Philadelphia, PA	S01 S02 S03 T01 T01 T03	10,000 Gal. 5,000,000 Gal. 40 Cu/Yds. 17,280,000 Gal/Day 17,280,000 Gal/Day 2,279 Gal/Hr.	Incinerator
G.R.O.W.S. Inc. Landfill PAD 00 042 9589 Bordentown & New Ford Mill Road Morrisville, PA 19067	D80 D81	2560 Acre/Ft. 64 Acres	G.W. Commercial (in closure process)

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85
Region I - Norristown

Hi-Pure Chemicals Inc. PAD 00 238 9104 Nazareth, PA	S01 T01	55,000 Gal. 50 Gal/Day	
Keystone Portland Cement Co. PAD 00 238 9559 Bath, PA	S02 T01 S02	93,000 Gal. 12,000 Gal/Day 520,000 Gal.	Commercial (storage prior to RRR)
Merck & Co. Inc. PAD 00 238 7926 Sumneytown Rd. West Point, PA 19486	T03	.95 Tons/Hr.	
National Rolling Mills Inc. PAD 00 232 4978 Morehall Rd. (Rte. 39) Malvern, PA 19355	S04 T03	2.25 Million Gals. 4 Gals/Hr.	G.W.
Naval Air Development Center PA8 61 700 24545 Warminister, PA	SO4 SO2 SO1	150,000 Gal. 2,000 Gal. 600 Gal.	G.W. Post Closure
Penn Power & Light Martin Creek Steam Electric Sta. PAD 00 076 5388 Martins Creek, PA	S04		G.W. Post Closure
Pennwalt Technological Center PAD 07 553 8033 King of Prussia, PA	T03		Incinerator
Pfizer Inc. PAD 00 239 1548 Easton, PA	S02 T01	160,000 Gal. 172,000 Gal/Day	
Phila. Coke Co., Inc. PAD 00 042 7906 Philadelphia, PA	SO4	40,000 Gal.	G.W.
Resource Tech. Services, Inc. PAD 98 055 0479 - PAAH0154 Conshohocken, PA 19428	S01 T04	60,000 Gal. 5,500 Gal.	Commercial
Rohm & Haas Corporation PAD 00 229 2068 Bristol Twp., PA	S01	56,320 Gal.	
Smithkline Chemicals PAD 98 055 0412 Conshohocken, PA 19428	TO3		Incinerator
SPS Technolgies Inc. PAD 00 000 0554 Jenkintown, PA	S04		G.W. Post Closure

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85

Region I - Norristown

Stanley G. Flagg Co. PAD 00 173 7899 Stowe, PA 19464	T04		G.W. Post Closure
Stauffer Chemical-Morrisville Plt. PAD 00 233 6410 2300 South Pennsylvania Ave. Morrisville, PA 19067	T02	31,500 Gals/Day	G.W. Post Closure
Superior Tube Co. PAD 00 235 3407 Cross Keys & Germantown Pike Collegeville, PA 19426	S01 S02	21,500 Gal. 18,000 Gal.	
Trane Thermal Co. PAD 06 900 6419 Conshohocken, PA	TO3 TO3	20 Gal/Hr. 60 Gal/Hr.	Incinerator
Uniform Tubes Inc. PAD 00 234 4463 200 W. 7th Ave. Trappe, PA 19426	S04	116,000 Gals.	G.W.
Unitank Terminal Service PAD 08 709 8653 Philadelphia, PA	S02 T01	6,881,400 Gal. 25,000 Gal/Day	Commercial
U. S. Steel-Fairless Hills PAD 00 237 5376 Fairless Hills, PA	D80 D80 D80	425 Acre/Ft. 165 Acre/Ft. 60 Acre/Ft.	G.W.
Waste Conversion PAD 08 569 0592 - PAAH0139 2869 Sandstone Drive Hatfield, PA 19440	T01 S01 S02		Commercial
Western Berks Refuse Authority LF PAD 00 044 3705 Poplar Neck Road, RD #1 Birdsboro, PA 19508	D80 T02	10 Acre/Ft.	G.W. Commercial

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85

Region II - Wilkes-Barre

Air Products and Chemicals, Inc. PAD 06 977 8967 P. O. Box 3151, RD #1 Tamaqua, PA 18252	S04 T02	20,000 Gals. 3,300 Gals/Day	
Atlas Powder Co.-Reynolds Plt. PAD 07 120 3046 Reynolds, PA 18252	T04	Opening Burning	
David Kahn, Inc. PAD 04 152 0242 Rt. 61 Deer Lake, PA 17961	D83	152,987 Gals.	G.W.
Drackett PAD 00 303 8544 East Stroudsburg, PA	D79	9,000 Gals. Closure Certified	G.W.
GII Corp.-Mirawal Products PAD 08 162 1096 Pottsville & Commerce Streets Port Carbon, PA 17965	S04	272,700 Gals.	G.W.
Instrument Specialties Co., Inc. PAD 00 216 1685 P. O. Box A Delaware Water Gap, PA 18237	T01	19,000 Gals/Day	
Keystone Chemical Co. PAD 00 064 7735 P. O. Box 35 Girardville, PA	S02 S02 D80 T01	14,000 Gals. 10,000 Gals. 400 Acre/Ft. 15,000 Gals.	G.W. Commercial (closed)
Lyncott Corp. PAD 06 050 6805 R. D. #1, Route T 554 New Milford, PA 18834	S01 S03 D80 T04 T04 T04	1,375,000 Gals. 75,000 Cubic Meters 1,900 Acre/Ft. 200 Tons/Hr. 400 Tons/Hr. 55,000 Gals./Day	G.W. Commercial (closed)
New Jersey Zinc Co., Inc. PAD 00 239 5887 Palmerton, PA	SO4 TO1 SO3	1,500,000 Gals. 720,000 Gals/Day 50,000 Cu/Yds.	G.W.
Reneer Films Corporation PAD 00 050 4746 Auburn, PA	S01	100,000 Gal.	
Tonolli Corp. PAD 07 361 3663 RD #1, Penna. Route 54 Mesquehoning, PA 18240	D80	121 Acre/Ft.	G.W.

9/84

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85
Region II - Wilkes-Barre

U. S. Army - Tobyhanna Depot PA 521 382 0892 Tobyhanna, PA	T01 S01	5.4 M.G./Year 22,000 Gal/year	
Zapata Industries, Inc. PAD 00 249 9440 P. O. Box 2 Frackville, PA 17931	T03	30 Gals/Hr.	Incinerator

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85
Region III - Harrisburg

Alcoa Fastener Div.-Lancaster Works PAD 00 302 6663 Fruitville Pike, Rte. 30 By-Pass Lancaster, PA 17604	SO4	3,260,000 Gals.	G.W.
Berkley Products Co., Inc. PAD 00 300 3894 405 South 7th Street Akron, PA	S01 S02 T04	63,250 Gal. 1,500 Gal. 2,880 Gal/Day	Commercial
Bethlehem Steel Corp. PAD 00 302 6531 Steelton, PA 17113	S03 T04		G.W.
Conversion Systems, Inc.- Honey Brook Treat. Fac. PAD 00 064 7701 Rt. 322 Honeybrook, PA 19344	S03 T04 S04	4,500 Cu/Yds. 300,000 Lbs/Hr. 200,000 Gals.	Commercial (Closure process)
Envirite PAD 01 015 4045 1600 Pennsylvania York, PA 17404	S02 T01	150,000 Gal. 50,000 Gals/Day	Commercial
Harley-Davidson, York Div. PAD 00 164 3691 York, PA	S01 S02 S03 T01	16,000 Gal. 75,000 Gal. 45 Cu/Yds. 140,000 Gal/Day	Commercial (Storage for RRR)
Heritage Metal Finishing PAD 00 301 2077 800 South Market Street Elizabethtown, PA 17022	S01	97 Cu/Yds.	
Industrial Solvents & Chemicals Co. PAD 09 873 2118 - PAAH0052 Box 511, RD 1 Stevens Road York Haven, PA 17370	T03	15 Gals/Hr.	Commercial Incinerator
Industrial Waste Removal, Inc. PAD 06 709 8822 Lewisberry, PA	S02	90,000 Gal.	Commercial
Kennametal, Inc. PAD 00 439 7683 Chaly Beate Spring Road Bedford, PA 15522	S02 T01 T02 D83	15,000 Gals. 3,000 Gal/Day 500 Gal/Day	G.W. (Closure process)
Lancaster Metals Science Corp. PAD 08 243 4747 1695 State Street East Petersburg, PA 17520	S04	12,000 Gals.	G.W. (Closure process)

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85
Region III - Harrisburg

Lanchester Corp.- Stabilized Disposal Site PAD 98 055 0545 Route 322 Honeybrook, PA 19344	D80 S04	1,000 Acre/Ft. 622,000 Gals.	G.W. Commercial (Closure process)
Letterkenny Army Depot PA 6213820503 Chambersburg, PA 17701	T04	5 Ton/Hr.	Incinerator
Molycorp Inc. PAD 00 302 5624 350 Sherman St. York, PA 17403	S04	90,000 Gals.	G.W. Abatement
National Standard Co. PAD 00 302 3371 Mt. Joy, PA	S04 TO1	525,000 Gals. 230,400 Gals/Day	G.W. Abatement
Pennex Aluminum Co. PAD 00 301 5716 Wellsville, PA	S04		G.W. Post Closure
Raymark Industries PAD 00 301 5328 123 E. Stiegel St. Manheim, PA 17545	D80	46.9 Acre/Ft.	G.W.
RCA Corporation PAD 00 302 6903 New Holland Ave. Lancaster, PA 17604	S04	5,000,000 Gals.	G.W.
Root Corp. - Rams Head Wire PAD 09 837 7737 York, PA 17347	S04 T02		G.W. Post Closure

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85
Region IV - Williamsport

American Color & Chemical Corp. PAD 00 304 7792 Mt. Vernon Street Lock Haven, PA 17745	T02 T04 T01 S01	1,296,000 Gals/Day 1,296 Gals/Day 1,296,000 Gals/Day 84,480 Gal.	G.W.
Arcos Corp. PAD 04 538 8972 Mt. Carmel, PA	T01		Closure by total removal, no post closure monitoring required
Bethlehem Steel Corp.-Williamsport PAD 00 305 3758 Foot of Campbell St. Williamsport, PA 17701	S04 T01	6,150,000 Gals.	G.W.
Cerro Metal Products PAD 08 673 3540 Bellefonte, PA 16823	T01	540,000 Gal/Day	
Corning Glass Works PAD 04 389 1530 State College, PA	TO4 TO4	222,000 Gal/Day 1,000 Gals.	
Emporium Specialty Corp. PAD 00 210 1335 Austin, PA	TO1	300 Gal/Day	
E. I. Dupont, Inc. PAD 00 303 8056 Towanda, PA	SO1	30,000 Gals.	
GTE Products Corp. PAD 00 304 4609 Towanda, PA	T01	2,000,000 Gal./Day	
GTE Products Corp. PAD 00 305 0846 Old Route 220 Muncy, PA 17756	S04	256,320 Gals.	G.W.
Koppers Co., Inc. PAD 05 672 3265 Montgomery, PA	SO4 S01	100,000 Gals. 5,000 Gals.	G.W.
Merck & Co., Inc. PAD 00 304 3353 First St. Off Hwy. 54 Riverside, PA 17868	T03 S01 S02	4.1 Tons/Hr. 7,040 Gals. 152,500 Gals.	Incinerator
Milton Manufacturing PAD 05 091 7186 Milton, PA	TO4	0.4 Tons/Hr.	

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85

Region IV - Williamsport

North American Car Corp. PAD 08 203 8480 Sayre, PA	S01	13,000 Gals.	
Piper Aircraft PAD 00 065 0481 Piper, PA	SO4		Closure by total removal no post closure monitoring to be required
Pure Industries - Pure Carbon Division PAD 00 210 3273 Coudersport, PA	SO1 TO1	33,000 Gal. 400,000 Gals/Day	
Rockwell International #1 PAD 00 433 5469 Dubois, PA	SO1	5,500 Gal.	
Ruetgers-Nease Chemical Co. PAD 00 043 6261 State College, PA	S01	150,000 Gal.	Permit issued (Container storage)
TRW Compressor Division PAD 98 055 1846 Danville, PA 17821	T01 T01 T01 T04	360,000 Gal/Day 12,000 Gal/Day 144,000 Gal/Day 15,000 Gal/Day	

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85

Region V - Pittsburgh

Alcoa Technical Center PAD 00 439 3138 New Kensington, PA 15068	SO4 TO2		G.W.
AMO Pollution Services, Inc. PAD 03 896 6230 Canonsburg, PA	SO1	5,500 Gals.	
Arco Polymers PAD 06 873 0225 Frankfort Road Monaca, PA 15061	S01 U147 F005 F002	5,500 Gal. 15,000 Lbs/Yr. 70,000 Lbs/Yr. 1,100 Lbs/Yr.	
Ashland Chemical PAD 00 079 7548 150 4th Avenue Freedom, Pittsburgh PA 15042	S01 S02	22,000 Gal. 3,000 Gal.	
Babcock & Wilcox PAD 00 065 1752 Mt. Street Kopple, PA 16136	S03 T01	253,940 Y. 180,000 U.	G.W.
Bethlehem Steel PAD 00 434 4222 Johnstown, PA 15907	S01 S02 S03 T04 T04	15,000 Gals. 46,000 Gals. 170,000 Gals. 82,000 Gals. 28,000 Gals.	G.W.
Breslube-Penn Inc. PAD 08 966 7695 Coraopolis, PA	TO1 TO4 D83	172,000 Gal/Day 172,000 Gal/Day	Commercial
Corning Glass Works PAD 00 432 6542 Charleroi, PA	SO2 SO2 TO1 SO2 SO1	120 Cu/Yds. 8,000 Gals. 6,600 Gal/Day 5,500 Gals. 110 Gals.	
Edgewater Steel Co. PAD 07 496 6789 300 College Avenue Cakmont, PA 15139	D80	28.7 Acre/Ft.	G.W.
Freuhauf Corp. PAD 00 433 8646 Uniontown, PA 15401	T02		G.W. Closure
Industrial Wastes Inc. PAD 000 621 839 Darlington, Twp.	D80	Closure	G.W. Commerical Post Closure

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85
Region V - Pittsburgh

Jones & Laughlin Steel-Aliquippa Works PAD 00 080 5028 Franklin Ave. Aliquippa, PA 15001	D80	3,200 Acre/Ft.	G.W.
Jones & Laughlin Steel-Midland Plant PAD 00 434 0444 Midland, PA 15059	S03 T04		G.W.
Kelly Run Sanitation PAD 00 481 0222 Elizabeth, PA 15037	D80	3,300 Acre/Ft.	G.W. Commercial
Koppers Co. Inc. PAD 06 376 4898 Miller Run Road Bridgeville, PA 15017	T03 T03	75 Gals/Hr. 125 Gals/Hr.	
Mill Service PAD 00 483 5146 RD No. 1, Cemetary Lane Yukon, PA 15698	S02 S03 S04 D80 TO1 T02	105,000 Gal. 180 Cu/Yds. 13,000,000 Gals. 990 Acre/Ft. 1,168,000 Gals/Day	G.W. Commercial
Mill Service PAD 05 908 7072 RD No. 1 Local Rd. 62021 Bulger, PA 15109	S02 D80 T01	90,000 Gals. 1250 Acre/Ft. 986,000 Gals/Day	G.W. Commercial
Mobil Chemical Co. Chemical Coating Div. PAD 00 434 1723 Rochester, PA 15074			G.W.?
Molycorp. Inc.-Washington Plt. PAD 03 006 3282 Caldwell & Green Sts. Washington, PA 15301	S04 S04	60,000 Gals. 60,000 Gals.	G.W.
Municipal & Industrial Disposal Co. PAD 00 043 6014 Henderson Road Buena Vista, PA 15018	S04 D83	5,000,000 Gals. 22,000,000 Gals.	G.W. Commercial
Norwin Plating Co. PAD 05 113 6984 Larimer, PA 15647	S04		Closure by total removal no post closure monitoring required
PPG Industries, Inc. PAD 00 433 6319 125 Colfax St. Springdale, PA 15144	T03	150 Gals/Hr.	Incinerator

9/84

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85
Region V - Pittsburgh

Teledyne Vasco PAD ~~00 437 9061~~ 057625479 Latrobe, PA	S03	5,000 cu. yds.	G.W. Post Closure
U.S. Steel Corp.-Taylor Landfill PAD 00 073 9672 Delwar Road West Miflin, PA 15122	D80	14,380 Acre/Ft.	G.W.
Westinghouse Electric Corp. PAD 00 500 0591 Insulating Materials Division Manor, PA	S01 S02 T03	8,250 Gals. 12,000 Gal. 90 Gal/Hr.	Incinerator
Westinghouse Electric Corp. PAD 005 000 500 Beaver, PA	S01 S02	8,800 Gals. 4,400 Gals.	

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85
Region VI - Meadville

Abex Corp. PAD 00 431 8416 P. O. Box 458 Meadville, PA	T02 T02	120,000 Gal/Day 86,000 Gal/Day	G.W.
Armco Inc. (Main Plant) PAD 00 432 5254 Butler, PA	T01	171,600 Gals/Day	G.W.
Armco Inc. (Plant #2) PAD 00 073 6934 Butler, PA	T01	12,000 Gals/Hr.	
General Electric Co. PAD 00 503 3055 2901 East Lake Road Erie, PA 16531	D80 T03	5 Acre/Ft. 125 Gals/Hr.	G.W.
International Metals Reclamation Co. (INMETCO) PAD 08 756 1015 U.S. Steel Ind. Pk. - Rt. 488 Ellwood City, PA 16117	S04	129,418 Gals.	G.W. Commercial (Storage for RRR)
National Forge Co. PAD 00 210 1418 Route 6 Irvine, PA 16329	D80	10-15 Acre/Ft.	G.W.
Pennzoil Products Co. - Penreco Div. PAD 06 562 6822 Rt. 068 Karns City, PA 16041	D80	2 Acre/Ft.	G.W.
Pennzoil Products Co. PAD 00 432 9835 Rouseville, PA	D80	3 Acre/Ft.	G.W.
Sechan Limestone Ind., Inc. PAD 00 286 0377 R. D. 1 Portersville, PA 16051	D80	800 Acre/Ft.	G.W. Commercial
Sharon Steel, Victor Posner Works PAD 00 193 3175 Sharon, PA 16146	D80		G.W. Assessment
Stackpole Corporation PAD 06 365 2820 201 Stackpole St. St. Mary's, PA 15857	S04 D83	520,000 Gals. 8,000,000 Gals.	G.W.
Talon, Div. of Textron PAD 98 055 0149 Meadville, PA	D83	10,000,000 Gals.	G.W.

PENNSYLVANIA MAJOR TSD FACILITIES - FY '85
Region VI - Meadville

Vogel Disposal Service, Inc. PAD 00 5802 0691 Harmony, PA 16046	D80		G.W. Commercial
Warnendale Plating PAD 00 438 6629 Mars, PA 16046	D83		G.W.
Witco Chemical PAD 00 438 850~~5~~0 Sarneborne Div. P. O. Box 336 Petrolia, PA	T01, T02	730,000 Tons/Yr.	G.W.

PENNSYLVANIA MAJOR GENERATORS - FY '85
REGION I - NORRISTOWN

Air Products & Chemicals, Inc.
PAD 00 239 6729
Emmaus, PA

Air Products - Houdry Labs
PAD 00 234 6732
Linwood, PA

Apollo Metals, Inc.
PAD 00 239 2827
Bethlehem, PA

Atlas Minerals & Chemicals, Inc.
PAD 00 042 8441
Mertztown, PA

AT&T Technology Systems
PAD 00 238 9252
Allentown, PA

Bishop Tube Company
PAD 08 186 8309
Frazer, PA

Caloric Corporation, Raytheon Co.
PAD 00 228 1723
Topton, PA

Congoleum Corp.
PAD 00 234 3200
Marcus Hook, PA

Diversified Printing Corp.
PAD 05 139 7768
Atglen, PA

East Penn Manuf. Co.
PAD 00 233 0165
Lyon Station, PA

General Battery Corp.
PAD 99 075 3089
Reading, PA

General Electric Co.
PAD 00 065 0788
Allentown, PA

G. E. Space Div.
PAD 00 168 0719
King of Prussia, PA

PENNSYLVANIA MAJOR GENERATORS - FY '85
REGION I - NORRISTOWN

Knoll International, Inc.
PAD 05 330 6015
East Greenville, PA

Krylon Dept. - Borden Co.
PAD 00 186 5906
Norristown, PA

Limerick Generation Station (Phila. Electric Co.)
PAD 00 076 5339
Pottstown, PA

Lukens Steel Company
PAD 00 232 6908
Coatsville, PA

Pennwalt Corp. - Cornwells Heights Plant
PAD 00 229 0823
Cornwells Heights, PA

Prestolite Battery
PAD 06 978 5632
Reading, PA

Safety Kleen Corp. 2-139-02
PAD 09 908 1812
Malvern, PA

SCM Allied Coated Products
PAD 04 733 1095
Phoenixville, PA

Sentry Paint & Chemical
PAD 00 248 0002
Darby, PA

Solid State Scientific, Inc.
PAD 00 0765 800
Willow Grove, PA

SPS Technologies
PAD 00 000 0554
Jenkintown, PA

U.S. Naval Base (HUB facility)
PA 417 002 2418
Philadelphia, PA

Wyeth Laboratories, Inc.
PAD 00 232 3541
West Chester, PA

9/84

PENNSYLVANIA MAJOR GENERATORS - FY '85
REGION II - WILKES-BARRE

Air Products and Chemicals, Inc.
PAD 06 9778967
Hometown, PA

Gould, Inc.
PAD 07 918 1186
Dunmore, PA

Heico, Inc.
PAD 00 303 7504
Delaware Water Gap, PA

ICI Americas, Inc.
PAD 00 079 7928
Reynolds, PA

Magnetic Laboratories
PAD 04 752 9920
Hallstead, PA

Mc-Graw Edison
PAD 00 303 8411
East Stroudsburg, PA

Owens-Illinois, Inc. - T.V. Products Div.
PAD 04 209 4039
Pittston, PA

RCA - Dunmore
PAD 01 882 372
Dunmore, PA 18512

PENNSYLVANIA MAJOR GENERATORS - FY '85
REGION III - HARRISBURG

Aluminum Company of America
PAD 00 188 7579
Lebanon, PA 17042

Armstrong Floor Plant
PAD 00 130 7792
Lancaster, PA 17604

Borg Warner Corp., York Division
PAD 00 302 7182
York, PA 17405

Cole - Litton Business Furniture
Loucks Mill Road Facility
PAD 09 873 7794
York, PA 17405

General Defense Corp. (Flinchbaugh Division)
PAD 06 977 9627
Red Lion, PA 17356

Moly Corp Incorporated
PAD 00 302 5624
York, PA 17403

Navy Ships Parts Control Center (HUB facility)
PA 3170022104
Mechanicsburg, PA 17055

New Cumberland Army Depot
PA 8213820642
New Cumberland, PA 17070

PENNSYLVANIA MAJOR GENERATORS - FY '85
REGION IV - WILLIAMSPORT

Poloron Products of Bloomsburg, Inc.
PAD 09 422 9812
Bloomsburg, PA

Rockwell International
PAD 98 071 4208
Clearfield, PA

TRW (Valve Div.)
PAD 00 303 7934
Danville, PA

9/84

PENNSYLVANIA MAJOR GENERATORS - FY '85
REGION V - SOUTHWESTERN

Allegheny Ludlum Steel
PAD 00 433 5162
West Leachburg, PA

J & L Steel - Pgh. Works
PAD 00 439 7410
Pittsburgh, PA

Neville Chemical
PAD 00 433 4157
Pittsburgh, PA

Robertshaw Controls Co.
PAD 00 431 6832
Youngwood, PA

Season-All Industries, Inc.
PAD 00 896 4868
Indiana, PA

U. S. Steel - Homestead
PAD 00 073 1380
Homestead, PA

U. S. Steel - Clairton
PAD 00 449 8010
Clairton, PA

U.S.S. Chemical - U.S. Steel Corp.
PAD 00 082 4730
Neville Island, PA

Volkswagen of America
PAD 08 295 9230
New Stanton, PA

Washington Steel Corp.
PAD 00 076 6063
Houston, PA

Westinghouse Electric Corp.
PAD 99 075 4913
Trafford, PA

9/84

PENNSYLVANIA MAJOR GENERATORS - FY '85
REGION VI - MEADVILLE

Lord Corp. Aerospace Products
PAD 00 503 1281
Erie, PA

National Forge Co. - Erie
PAD 04 576 7448
Erie, PA

Midstate Trading
PAD 98 055 2269 - PAAH0248
Williamsport, PA 17701

Coastal Well Service (William C. Meisel)
PAD 98 071 4869 - PAAH0098
Emporium, PA 15834

Ecology Chemical and Refining Co. - Withdrew Part B for storage, removed from
PAD 06 563 6342 - PAAH0039 major TSD list commercial
Manor, PA 15665

References

EPA, Handbood for Remedial Action at Waste Disposal Sites, Technology Transfer, EPA 625/6-82-006, June 1982.

EPA, Handbook for Evaulating Remedial Action Technology Plans, EPA-600/2-83-076, August 1983.

EPA, Average and Maximum Engineering Cost Estimates for Closure, Pope-Reid Associates, Inc., St. Paul, Minn., October 1983.

EPA, Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities Under RCRA, Subtitle C, Section 3004, Draft Guidance, Financial Requirements: Interim Status Standards (40 CFR 265, Subpart H), SW-913 1981, addendum.

DRAFT

CONTAINER-STORAGE AREA
BONDING WORKSHEET

1.	Maximum container and/or labpack capacity.	________________
2.	Unit cost to dispose of wastes.	________________
3.	Cost to dispose of inventory (Line 1 X 2).	________________
4.	Total volume of sump.	________________
5.	Unit cost to dispose of sump contents as hazardous waste.	________________
6.	Cost to properly dispose of sump contents (Line 4 X 5).	________________
7.	Area of storage pad.	________________
8.	Unit cost for soil testing and analysis of pad area.	________________
9.	Cost to determine contamination of storage pad area (Line 7 X 8).	________________
10.	Estimate volume of storage pad and sump materials.	________________
11.	Unit cost for demolition of pad and sump.	________________
12.	Cost to demolish pad and sump (Line 10 X 11).	________________
13.	Unit cost to transport and dispose of pad and sump materials Line 10 X 13).	________________
14.	Total cost to decontaminate container storage area (Line 3 + 6 + 9 + 12)	________________

Note: If there is evidence of past spill activity, extensive sampling and excavation should be included in the closure plan and this estimate.

DRAFT

ABOVE GROUND TANKS
BONDING WORKSHEET

1. Maximum volume of liquids to be removed from tank and piping system. ________________

2. Unit cost to dispose of wastes. ________________

3. Cost to dispose of inventory (Line 1 X 2). ________________

4. Estimate volume of tank, piping system and equipment. ________________

   Minimum steps for decontamination:

   *Disconnect and cap all fill, guage, vent and product lines.

   *Purge the tank of toxic or flammable vapors (by mechanical, steam or natural ventilation).

   *Remove all sludges and tank residues (by manual labor, flushing with water or vacuum tank truck).

   *Thoroughly clean inside of tank, roof, sides and bottom (high pressure hose, steam cleaning, sandblasting or power wire-brushing).

5. Unit cost for decomtamination. ________________

6. Cost to decontaminate tank (Line 4 X 5). ________________

7. Unit cost for proper disposal of cleaning residues. ________________

8. Cost to dispose of cleaning residues as hazardous waste (Line 4 X 7). ________________

9. Estimate amount of tank materials to be dismantled and disposed of or scrapped. ________________

10. Unit cost to dispose of tank materials. ________________

11. Cost to dispose of tank (Line 9 X 10). ________________

12. Calculate area of secondary containment area. ________________

13. Unit cost to perform soil sampling and analysis. ________________

14. Cost to determine contamination of secondary containment area (Line 12 X 13). ________________

15. Total cost to decontaminate tank (Line 3 + 6 + 8 + 11 + 14). ________________

Note: If there is evidence of past spill activity, extensive sampling and excavation should be included in the closure plan and this estimate.

SURFACE IMPOUNDMENTS - TREATMENT OR STORAGE
BONDING WORKSHEET A
DISPOSING OF INVENTORY

1. Maximum volume of waste to be removed and disposed off-site. __________

2. Unit cost to dispose of waste (includes transportation). __________

3. Total cost to dispose of inventory (Line 1 X 2). __________

Instructions

Bonding Worksheet

Each applicant for a hazardous waste permit is required to provide bonding in an amount equal to the costs that would be incurred if the Commonwealth had to close the facility and provide 30 years of post-closure care.

Only one bond may be carried for each permitted facility. A facility may be composed of multiple components. For instance, a multi-component facility may have a container storage area, an incinerator, a tank and a landfill. All of these components would be bonded under a single bond.

Bonding worksheets are provided for the following types of facilities:

1. Container storage
2. Tanks
3. Surface impoundments used for storage and treatment
4. Surface impoundments used for disposal
5. Waste Piles
6. Land Treatment
7. Landfills
8. Incinerators
9. Thermal Treatment
10. Physical Chemical and Biological Treatment

Applicable worksheet must be completed for each component of the facility. Extra space below each item on the worksheets is provided to show work and assumptions made. For the worksheets covering maintenance costs, assume that at least 10% of the total surface area of the final cover, 10% of the total surface area of surface water run-on and runoff structures, and 10% of the total length of fence will need to be repaired over the 30-year post-closure period. For other items on the maintenance costs worksheets, assumptions will have to be made by the applicant.

Most of the costs may be obtained from contractors, liner manufacturers, cleanup contractors, labs and consulting engineers. EPA also has published reports and technical references which may serve as a source of information on costs. A list of some of the EPA references can be found attached to these instructions.

The costs for bonding each facility component must be entered on the "Summary of Bond Costs" sheet, and totaled. This total is then divided by .85 to provide for administrative costs and cost overruns. This would be the final facility bond amount.

SURFACE IMPOUNDMENTS - TREATMENT OR STORAGE
BONDING WORKSHEET B
DECONTAMINATING THE FACILITY

1. Total volume of liner and contaminated soils and materials to be removed and disposed of off-site. ________

2. Unit cost to dispose of liner and contaminated materials (includes transportation). ________

3. Cost to dispose of liner and contaminated materials (Line 1 X 2). ________

4. Equipment to be decontaminated based on ______________ surface area. ________

5. Unit cost to decontaminate. ________

6. Cost to decontaminate (Line 4 X 5). ________

7. Volume of liquid generated during decontamination (based on gals. per ft^2 required for decontamination, e.g., gals/ft^2 X ft^2 = total gals.) ____________

8. Unit cost to dispose of liquid (includes transportation). ____________

9. Cost to dispose (Line 7 X 8). ____________

10. Total cost to decontaminate (Line 3 + 6 + 9). ____________

SURFACE IMPOUNDMENT - TREATMENT OR STORAGE
BONDING WORKSHEET C
REGRADING

1. Surface area to be regarded and vegetated. __________

2. Unit cost to regrade area. __________

3. Cost to regrade (Line 1 X 2). __________

4. Total amount of soil needed to transport on-site (if needed). __________

5. Unit cost of soil (includes transportation). __________

6. Cost of extra soil (Line 4 X 5). __________

7. Total cost of regrading (Line 3 + 6). __________

SURFACE IMPOUNDMENTS - TREATMENT OR STORAGE
BONDING WORKSHEET D
REVEGETATION OF
DISTURBED AREAS AND DRAINAGE WAYS

1.	Total area to be revegetated (acres).	________
2.	Type of vegetation ________ price per lb (including labor).	________
3.	Seeding rate per acre.	________
4.	Cost of seed (Line 1 X 2 X 3).	________
5.	Recommended fertilizer requirements.	________
6.	Quantity of fertilizer per acre.	________
7.	Unit cost of fertilizer (includes labor).	________
8.	Cost of fertilizer (Line 1 X 6 X 7).	________

9. Type of mulch ____________ unit price (includes labor) ____________

10. Mulching rate. ____________

11. Cost of mulch (Line 1 X 9 X 10). ____________

12. Total Cost of vegetation (Line 4 + 8 + 11). ____________

SURFACE IMPOUNDMENTS - TREATMENT OR STORAGE
BONDING WORKSHEET E
GROUNDWATER MONITORING

1. Number of wells monitored. __________

2. Samples per well. __________

3. Total number of samples (Line 1 X 2). __________

4. Number of analyses per sample. __________

5. Total number of analyses (Line 3 X 4). __________

6. Unit cost to collect sample (includes shipping). __________

7. Cost to collect samples (Line 3 X 6). __________

8. Average cost of a single analysis. __________

Surface Impoundments - Treatment or Storage
Worksheet E - continued

9. Cost of analyses (Line 5 X 8). ________

10. Evaluation of data (manhours). ________

11. Unit cost per manhour. ________

12. Cost of evaluation (Line 10 X 11). ________

13. Total number of samplings per year. ________

14. Cost of sampling per year [(Line 7 + 9 + 12) X 13]. ________

15. Years of sampling. ________

16. Total cost of groundwater monitoring (Line 14 X 15). ________

SURFACE IMPOUNDMENT - TREATMENT OR STORAGE
BONDING WORKSHEET E
SUMMARY OF COSTS

1. Total from Line 3, Worksheet A ________

2. Total from Line 10, Worksheet B ________

3. Total from Line 7, Worksheet C ________

4. Total from Line 12, Worksheet D ________

5. Total from Line 16, Worksheet E ________

6. Total Cost for Bonding (Line 1 + 2 + 3 + 4 + 5) ________

SURFACE IMPOUNDMENTS - DISPOSAL
BONDING WORKSHEET A
DISPOSING OF INVENTORY AND STABILIZATION

1. Maximum volume of waste to be placed in S.I. before closure. __________

2. Estimated volume of contaminated residues and soils to be disposed of at closure. __________

3. Total volume of waste and residues to be disposed of at closure (Line 1 + 2). __________

4. Unit cost of disposing of waste and residue. __________

5. Cost to dispose of waste and residues (Line 3 X 4). __________

6. Total volume of waste to be stabilized (amount of liquid and sludges that must be dewatered by adding soil or other material). __________

7. Type of stabilizing material. __________

8. Unit cost to mix in stabilizing material (this includes material, transportation and labor costs). ____________

9. Total cost of stabilization (Line 6 X 8). ____________

10. Total disposal costs (Line 5 + 9). ____________

SURFACE IMPOUNDMENTS - DISPOSED
BONDING WORKSHEET B
DECONTAMINATING THE FACILITY

1. Total volume of contaminated soils and materials to be removed and disposed of off-site. ____________

2. Unit cost to dispose of contaminated materials (incldues transportation). ____________

3. Cost to dispose contaminated materials (Line 1 X 2). ____________

4. Equipment to be decontaminated based on ________________ surface area. ____________

5. Unit cost to decontaminate. ____________

6. Cost to decontaminate (Line 4 X 5). ____________

7. Volume of liquid generated during decontamination (base on gals. per $ft.^2$ required for decontamination, e.g. $gals/ft^2 \times ft^2$ = total gals.). __________

8. Unit cost to dispose of liquid (includes transportation). __________

9. Cost to dispose (Line 7 X 8). __________

10. Total cost to decontaminate (Line 3 + 6 + 9). __________

SURFACE IMPOUNDMENTS - DISPOSAL
BONDING WORKSHEET C
CAP AND FINAL COVER PLACEMENT

1.	Maximum area to be capped and covered (includes only areas that will be open at any one time).	________
2.	Unit cost of placing one foot of stable intermediate cover material for base of cap.	________
3.	Cost of base for cap (Line 1 X 2).	________
4.	Unit cost of ________ material to be used as cap (includes transportation and installation).	________
5.	Cost of cap (Line 1 X 4).	________
6.	Unit cost of drainage layer (if applicable) (includes transportation and installation).	________
7.	Cost to place drainage layer (Line 1 X 6).	________

8. Unit cost to install 2 feet of final cover (includes installation). ________

9. Cost to install 2" final cover (Line 1 X 8). ________

10. Total cost of cap and final cover (Lines 3 + 5 + 7 + 9). ________

SURFACE IMPOUNDMENTS - DISPOSAL
BONDING WORKSHEET D
REVEGETION OF FINAL COVER, DISTURBED AREAS AND DRAINAGE WAYS

1. Total area to be revegetated (acres). __________

2. Type of vegetation __________ price per lb. (including labor). __________

3. Seeding late per acre. __________

4. Cost of seed (Line 1 X 2 X 3). __________

5. Recommended fertilizer requirements. __________

6. Quantity of fertilizer per acre. __________

7. Unit cost of fertilizer (includes labor). __________

8. Cost of fertilizer (Line 1 X 6 X 7). __________

Surface Impoundment - Disposal
Worksheet D - continued

9. Type of mulch ____________ unit price (includes labor). ____________

10. Mulching rate. ____________

11. Cost of mulch (Line 1 X 9 X 10). ____________

12. Total cost of vegetation (Line 4 + 8 + 11). ____________

SURFACE IMPOUNDMENTS - DISPOSAL
BONDING WORKSHEET E
GROUNDWATER MONITORING

1. Number of wells monitored. __________

2. Samples per well. __________

3. Total number of samples (Line 1 X 2). __________

4. Number of parameters per sample. __________

5. Total number of analyses (Line 3 X 4). __________

6. Unit cost to collect sample
(includes shipping). __________

7. Cost to collect samples (Line 3 X 6). __________

8. Average cost of a single analysis. __________

9. Cost of analyses (Line 5 X 8). ________

10. Evaluation of data (manhours). ________

11. Unit cost per manhour. ________

12. Cost of evaluation (Line 10 x 11). ________

13. Total number of samplings per year ________

14. Cost of sampling per year [(Line 7 + 9 + 12) X 13]. ________

15. Years of sampling (30 years). ________

16. Total cost of groundwater monitoring (Line 14 X 15). ________

SURFACE IMPOUNDMENTS - DISPOSAL

BONDING WORKSHEET F

MAINTENANCE COSTS

1. Repair of cap and final cover (30 year term). __________

2. Repair of surface water run-on structures (30 year term). __________

3. Repair of fence. __________

4. Repair of leachate conveyance and collection structures (not including surface impoundment or tanks). __________

5. Well maintenance and repair. __________

6. Other costs. __________

7. Total maintenance costs (Line 1 + 2 + 3 + 4 + 5 + 6). __________

SURFACE IMPOUNDMENTS - DISPOSAL

BONDING WORKSHEET G

SUMMARY OF COSTS

1. Total from Line 10, Worksheet A ________

2. Total from Line 10, Worksheet B ________

3. Total from Line 10, Worksheet C ________

4. Total from Line 12, Worksheet D ________

5. Total from Line 16, Worksheet E ________

6. Total from Line 7, Worksheet F ________

7. Total Cost for Bonding (Line 1 + 2 + 3 + 4 + 5 + 6). ________

WASTE PILES
BONDING WORKSHEET A
DISPOSING OF INVENTORY

1. Maximum volume of waste to be removed and disposed off-site. __________

2. Unit cost to dispose of waste (includes transportation). __________

3. Total cost to dispose of inventory (Line 1 X 2). __________

WASTE PILES
BONDING WORKSHEET B
DECONTAMINATING THE FACILITY

1. Total volume of liner and contaminated soils and materials to be removed and disposed of off-site. __________

2. Unit cost to dispose of liner and contaminated materials (includes transportation). __________

3. Cost to dispose of liner and contaminated materials (Line 1 X 2). __________

4. Equipment to be decontaminated based on ________________ surface area. __________

5. Unit cost to decontaminate. __________

6. Cost to decontaminate (Line 4 X 5). __________

7. Volume of liquid generated during decontamination (base on gals. per ft^2 required for decontamination, e.g. gals/ft^2 X ft^2 = total gals.). __________

8. Unit cost to dispose of liquid (includes transportation). __________

9. Cost to dispose (Line 7 X 8). __________

10. Total cost to decontaminate (Line 3 + 6 + 9). __________

WASTE PILES
BONDING WORKSHEET C
REGRADING

1. Surface area to be regraded and vegetated. __________

2. Unit cost to regrade area. __________

3. Cost to regrade (Line 1 X 2). __________

4. Total amount of soil needed to transport on-site (if needed). __________

5. Unit cost of soil (includes transportation). __________

6. Cost of extra soil (Line 4 X 5). __________

7. Total cost of regrading (Line 3 + 6). __________

WASTE PILES

BONDING WORKSHEET D

REVEGETATION OF FINAL COVER,

DISTURBED AREAS AND DRAINAGE WAYS

1. Total area to be revegetated (acres). ____________

2. Type of vegetation ___________ price per lb (including labor). ____________

3. Seeding rate per acre. ____________

4. Cost of seed (Line 1 X 2 X 3). ____________

5. Recommended fertilizer requirements. ____________

6. Quantity of fertilizer per acre. ____________

7. Unit cost of fertilizer (includes labor). ____________

8. Cost of fertilizer (Line 1 X 6 X 7). ____________

9. Type of mulch ___________ unit price (includes labor) ___________

10. Mulching rate. ___________

11. Cost of mulch (Line 1 X 9 X 10). ___________

12. Total Cost of vegetation (Line 4 + 8 + 11). ___________

WASTE PILES
BONDING WORKSHEET E
GROUNDWATER MONITORING

1. Number of wells monitored. ________

2. Samples per well. ________

3. Total number of samples (Line 1 X 2). ________

4. Number of analyses per sample. ________

5. Total number of analyses (Line 3 X 4). ________

6. Unit cost to collect sample (includes shipping). ________

7. Cost to collect samples (Line 3 X 6). ________

8. Average cost of a single analysis. ________

9. Cost of analyses (Line 5 X 8). ________

10. Evaluation of data (manhours). ________

11. Unit cost per manhour. ________

12. Cost of evaluation (Line 10 X 11). ________

13. Total number of samplings per year. ________

14. Cost of sampling per year [(Line 7 + 9 + 12) X 13]. ________

15. Years of sampling (30 years). ________

16. Total cost of groundwater monitoring (Line 14 X 15). ________

WASTE PILES

BONDING WORKSHEET G

SUMMARY OF COSTS

1.	Total from Line 3, Worksheet A	________
2.	Total from Line 10, Worksheet B	________
3.	Total from Line 7, Worksheet C	________
4.	Total from Line 12, Worksheet D	________
5.	Total from line 16, Worksheet E	________
6.	Total Cost (Line 1 + 2 + 3 + 4 + 5).	________

LAND TREATMENT

BONDING WORKSHEET A

DISPOSING OF FINAL INVENTORY

1. Maximum volume of waste to be disposed before closure. ____________

2. Unit cost to dispose of waste off-site (includes transportation). ____________

3. Total cost to dispose of waste (Line 1 X 2). ____________

LAND TREATMENT
BONDING WORKSHEET B
DECONTAMINATING THE FACILITY

1. Total volume of contaminated soils and materials to be removed and disposed of off-site. ____________

2. Unit cost to dispose contaminated materials (includes transportation). ____________

3. Cost to dispose of contaminated materials (Line 1 X 2). ____________

4. Equipment to be decontaminated based on ______________ surface area. ____________

5. Unit cost to decontaminate. ____________

6. Cost to decontaminate (Line 4 X 5). ____________

7. Volume of liquid generated during decontamination (based on gals. per ft^2 required for decontamination, e.g., gals/ft^2 X ft^2 = total gals.) ________

8. Unit cost to dispose of liquid (includes transportation). ________

9. Cost to dispose (Line 7 X 8). ________

10. Total cost to decontaminate (Line 3 + 6 + 9). ________

LAND TREATMENT
BONDING WORKSHEET C
CAP AND FINAL COVER

In most cases, it is not anticipated that a cap or final cover will be part of the facility design. Most land treatment facilities will only be designed for incorporation into the soil and revegetate. If, however, a cap or cover is included in the application for permit, a worksheet such as this may be applicable. Please note that other items may be needed based on the facility's proposed design and operation.

1.	Maximum area to be capped and covered (includes only areas that will be open at any one time).	________
2.	Unit cost of ________ material to be used as cap (includes transportation and installation).	________
3.	Cost of cap (Line 1 X 2).	________
4.	Unit cost of drainage layer (if applicable) (includes transportation and installation).	________
5.	Cost of drainage layer (Line 1 X 4).	________

6. Unit cost to install 2' final cover. __________

7. Cost to install 2' of final cover (Line 1 X 7). __________

8. Total Cost (Line 3 + 5 + 7). __________

LAND TREATMENT

BONDING WORKSHEET D

REVEGETATION OF FINAL COVER,

DISTURBED AREAS AND DRAINAGE WAYS

1. Total area to be revegetated (acres). __________

2. Type of vegetation __________ price per lb (including labor). __________

3. Seeding rate per acre. __________

4. Cost of seed (Line 1 X 2 X 3). __________

5. Recommended fertilizer requirements. __________

6. Quantity of fertilizer per acre. __________

7. Unit cost of fertilizer (includes labor). __________

8. Cost of fertilizer (Line 1 X 6 X 7). __________

9. Type of mulch ___________ unit price (includes labor) ___________

10. Mulching rate. ___________

11. Cost of mulch (Line 1 X 9 X 10). ___________

12. Total Cost of vegetation (Line 4 + 8 + 11). ___________

LAND TREATMENT
BONDING WORKSHEET E
GROUNDWATER MONITORING

1. Number of wells monitored. ________

2. Samples per well. ________

3. Total number of samples (Line 1 X 2). ________

4. Number of analyses per sample. ________

5. Total number of analyses (Line 3 X 4). ________

6. Unit cost to collect sample (includes shipping). ________

7. Cost to collect samples (Line 3 X 6). ________

8. Average cost of a single analysis. ________

9. Cost of analyses (Line 5 X 8). __________

10. Evaluation of data (manhours). __________

11. Unit cost per manhour. __________

12. Cost of evaluation (Line 10 X 11). __________

13. Total number of samplings per year. __________

14. Cost of sampling per year [(Line 7 + 9 + 12) X 13]. __________

15. Years of sampling (30 years). __________

16. Total cost of groundwater monitoring (Line 14 X 15). __________

LAND TREATMENT

BONDING WORKSHEET F

UNSATURATED ZONE MONITORING

Soil-pore Liquid Monitoring:

1. Number of lysimeters monitored. ______

2. Samples per lysimeter. ______

3. Total number of samples (Line 1 X 2). ______

4. Number of analyses per sample. ______

5. Total number of analyses (Line 3 X 4). ______

6. Unit cost to collect sample (includes shipping). ______

7. Cost to collect samples (Line 3 X 6). ______

8. Average cost of a single analysis. ______

9. Cost of analyses (Line 5 X 8). ________

10. Evaluation of data (manhours). ________

11. Unit cost per manhour. ________

12. Cost of evaluation (Line 10 X 11). ________

13. Total number of samplings per year. ________

14. Cost of sampling per year [(Line 7 + 9 + 12) X 13]. ________

15. Years of sampling. ________

16. Cost of soil-pore liquid monitoring (Line 14 X 15). ________

Land Treatment
Worksheet F - continued

Soil-core Monitoring:

17. Number of soil borings. ________

18. Samples per boring. ________

19. Total number of samples (Line 1 X 2). ________

20. Number of analyses per sample. ________

21. Total number of analyses (Line 3 X 4). ________

22. Unit cost to collect sample (includes shipping). ________

23. Cost to collect samples (Line 3 X 6). ________

24. Average cost of a single analysis. ________

25. Cost of analyses (Line 5 X 8). ________

26. Evaluation of data (manhours). ________

27. Unit cost per manhour. ________

28. Cost of evaluation (Line 10 X 11). ________

29. Total number of samplings per year. ________

30. Cost of sampling per year [(Line 7 + 9 + 12) X 13]. ________

31. Years of sampling. ________

32. Cost of soil-core liquid monitoring (Line 14 X 15). ________

33. Total cost unsaturated zone monitoring (Line 16 + 32). ________

LAND TREATMENT
BONDING WORKSHEET G
MAINTENANCE COSTS

1. Repair of cap and final cover (30 year term). ________

2. Repair of surface water run-on and runoff structures (30 year term). ________

3. Repair of fence. ________

4. Repair of leachate conveyance and collection structures (not including surface impoundment or tanks). ________

5. Well and lysimeter maintenance and repair. ________

6. Other costs. ________

7. Total maintenance costs (Line 1 + 2 + 3 + 4 + 5 + 6). ________

LAND TREATMENT
BONDING WORKSHEET H
SUMMARY OF COSTS

1. Total from Line 3, Worksheet A ________

2. Total from Line 10, Worksheet B ________

3. Total from Line 8, Worksheet C ________

4. Total from Line 12, Worksheet D ________

5. Total from Line 16, Worksheet E ________

6. Total from Line 33, Worksheet F ________

7. Total from Line 7, Worksheet G ________

8. Total Cost (Line 1 + 2 + 3 + 4 + 5 + 6 + 7). ________

LANDFILLS

BONDING WORKSHEET A

DISPOSING OF INVENTORY

1. Maximum volume of waste to be placed in disposal area as part of closure. ______

2. Estimated volume of contaminated residues and soils to be disposed of as part of closure. ______

3. Total volume of waste and residues to be disposed of (Line 1 + 2). ______

4. Unit Cost of disposing of waste and residues. ______

5. Total cost to dispose of waste and residues (Line 3 X 4) ______

LANDFILLS
BONDING WORKSHEET B
DECONTAMINATING THE FACILITY

1. Total volume of contaminated soils and materials to be removed and disposed of off-site. ________

2. Unit cost to dispose of contaminated materials (includes transportation). ________

3. Cost to dispose of soil and contaminated materials (Line 1 X 2). ________

4. Landfill equipment to be decontaminated based on surface area. ________

5. Unit cost to decontaminate. ________

6. Cost to decontaminate (Line 4 X 5). ________

7. Volume of liquid generated during decontamination (base on gallons per $foot^2$ required for decontamination, e.g. $gals/ft^2 \times ft^2$ = Total Gals.). ________

8. Unit cost to dispose of liquid (includes transportation). ________

9. Cost to dispose (Line 7 X 8). ________

10. Total cost to decontaminate (Line 3 + 6 + 9). ________

LANDFILLS

BONDING WORKSHEET C

CAP AND FINAL COVER PLACEMENT

1. Maximum area to be capped and covered (includes only areas that will be open at any one time). ____________

2. Unit cost of placing one foot of stable intermediate cover material for base of cap. ____________

3. Total cost of base for cap (Line 1 X 2). ____________

4. Unit cost of ____________ material to be used as cap (includes transportation and installation cost) ____________

5. Cost to cap (Line 1 X 4) ____________

6. Unit cost of drainage layer (if applicable) (installed cost). ____________

7. Cost to place drainage layer (Line 1 X 6). ____________

8. Unit cost to install 2' final cover (installed cost) ________

9. Cost to install 2' final cover (Line 1 X 8). ________

10. Total cost of cap and final cover (Lines 3 + 5 + 7 + 9). ________

LANDFILLS
BONDING WORKSHEET D
REVEGETATION OF FINAL COVER, DISTURBED AREAS AND DRAINAGE WAYS

1. Total area to be revegetated (acres). ____________

2. Type of vegetation ____________ price per lb (including labor). ____________

3. Seeding rate per acre. ____________

4. Cost of seed (Line 1 X 2 X 3). ____________

5. Recommended fertilizer requirements. ____________

6. Quantity of fertilizer per acre. ____________

7. Unit cost of fertilizer (includes labor). ____________

8. Cost of fertilizer (Line 1 X 6 X 7). ____________

9. Type of mulch ___________ unit price (includes labor) ___________

10. Mulching rate. ___________

11. Cost of mulch (Line 1 X 9 X 10). ___________

12. Total Cost of vegetation (Line 4 + 8 + 11). ___________

LANDFILLS

BONDING WORKSHEET E

GROUNDWATER MONITORING

1. Number of wells monitored. ________

2. Samples per well. ________

3. Total number of samples (Line 1 X 2). ________

4. Number of analyses per sample. ________

5. Total number of analyses (Line 3 X 4). ________

6. Unit cost to collect sample (includes shipping). ________

7. Cost to collect samples (Line 3 X 6). ________

8. Average cost of a single analysis. ________

9. Cost of analyses (Line 5 X 8). __________

10. Evaluation of data (manhours). __________

11. Unit cost per manhour. __________

12. Cost of evaluation (Line 10 X 11). __________

13. Total number of samplings per year. __________

14. Cost of sampling per year [(Line 7 + 9 + 12) X 13]. __________

15. Years of sampling (30 years). __________

16. Total cost of groundwater monitoring (Line 14 X 15). __________

LANDFILLS
BONDING WORKSHEET F
MAINTENANCE COSTS

1. Repair of cap and final cover (30 year term). __________

2. Repair of surface water run-on and runoff structures (30 year term). __________

3. Repair of fence. __________

4. Repair of leachate conveyance and collection structures (not including surface impoundment or tanks). __________

5. Well maintenance and repair. __________

6. Other costs. __________

7. Total maintenance costs (Line 1 + 2 + 3 + 4 + 5 + 6). __________

LANDFILL
BONDING WORKSHEET G
SUMMARY OF COSTS

1. Total from Line 5, Worksheet A ____________

2. Total from Line 10, Worksheet B ____________

3. Total from Line 10, Worksheet C ____________

4. Total from Line 12, Worksheet D ____________

5. Total from line 16, Worksheet E ____________

6. Total from Line 7, Worksheet F ____________

7. Total Cost for Bonding
   (Line 1 + 2 + 3 + 4 + 5 + 6). ____________

INCINERATOR
BONDING WORKSHEET

1. Maximum volume of waste to be removed from storage and from pipes, lines and equipment. ______________

2. Unit cost to dispose of waste off-site. ______________

3. Cost to dispose of inventory. (line 1 x line 2). ______________

4. Estimate the volume of the pipes, lines and equipment of the total incineration system. ______________

5. Unit cost for decontamination of pipes, lines and equipment. Use guidelines to estimate or determine this value. ______________

6. Cost to decontaminate pipes, lines and equipment (line 4 x line 5). ______________

7. Estimate area of exposed surfaces to be decontaminated. ______________

8. Unit cost for surface decontamination (see guidelines). ______________

9. Cost to decontaminate surfaces (line 7 x line 8). ______________

10. Estimate volume of waste generated during decontamination activities. ______________

11. Unit cost to dispose of decontamination wastes. ______________

12. Cost to dispose of decontamination wastes (line 10 x line 11). ______________

13. Estimate number of samples and type of tests that are needed to verify decontamination. ______________

14. Unit cost to collect and analyze samples. ______________

15. Cost to provide analytical documentation (line 13 to line 14). ______________

16. Estimate volume of process residuals (scrubber wastes, quench water, ash, etc.). ______________

17. Unit cost to dispose of process residuals. ______________

18. Cost to dispose of process residuals (line 16 x line 17). ______________

19. Cost for closure of a hazardous waste incinerator facility (line 3 + line 6 + line 9 + line 12 + line 15 + line 18). ______________

Bonding Worksheets for Thermal Treatment Facilities, and Physical, Chemical, or Biological Treatment Facilities have not been developed, to date.

Summary of Bonding Costs

1. Total cost for container storage ______________

2. Total cost for tank storage ______________

3. Total cost for surface impoundments - storage or treatment ______________

4. Total cost for surface impoundments - disposal ______________

5. Total cost for waste piles ______________

6. Total cost for land treatment ______________

7. Total cost for landfills ______________

8. Total cost for incineration ______________

9. Total cost for physical, chemical and biological treatment ______________

10. Total cost for facility (add lines 1 - 9) ______________

11. Total bond for facility (line 10 ÷ .85) ______________

    (Cost for administration, review, professional certification and cost overruns (15% increase) ______________

BOND FORMS
AND
BOND ENDORSEMENT FORMS

1. Form No. ER-SWM-101 Collateral Bond for Hazardous Waste Facility
2. Form No. ER-SWM-102 Collateral Bond Endorsement - Additional Bond
3. Form No. ER-SWM-103 Collateral Bond Endorsement - Transfer of Permit
4. Form No. ER-SWM-104 Collateral Bond Endorsement - Replacement Bond
5. Form No. ER-SWM-105 Collateral Bond Endorsemment - Pre-Existing Liability -
6. Form No. ER-SWM-106 Collateral Bond Endorsemment - Partial Replacement Bond
7. Form No. ER-SWM-107 Assignment of Certificate of Deposit
8. Form No. ER-SWM-108 Schedule for Deposit of Collateral
9. Form No. ER-SWM-111 Surety Bond for Hazardous Waste Facility
10. Form No. ER-SWM-112 Surety Bond Endorsement - Additional Bond
11. Form No. ER-SWM-113 Surety Bond Endorsement - Transfer of Permit
12. Form No. ER-SWM-114 Surety Bond Endorsement - Replacement Bond
13. Form No. ER-SWM-115 Surety Bond Endorsement - Pre-Existing Liability

(See attached ER-SWM-109 Instructions for Submission of Certificates of Deposit for completing Form No. ER-SWM-107 Assignment of Certificate of Deposit).

(See atttached ER-SWM-110 Instructions for Submission of Negotiable Government Securities for proper submittal of this type of collateral)

DESCRIPTION OF HAZARDOUS WASTE BOND FORMS

There are two ways of depositing bond with the Department: Surety and Collateral. As a result, there are two basic bond forms for Hazardous Waste Facilities: "Collateral Bond for Hazardous Waste Facility" (Form No. ER-SWM-101) and "Surety Bond for Hazardous Waste Facility"(Form No. ER-SWM-111). Each time additional bond is required, a surety or collateral bond will have to be submitted.

In addition to the basic surety or collateral bond forms, there are a number of "bond endorsements" to deal with specific situations which are not included in the basic bond forms. The following is a description of the various "bond endorsement" forms and situations requiring their use.

ENDORSEMENTS TO	TYPE OF ENDORSEMENTS
1. Surety and Collateral (Surety Form No. ER-SWM-112, Collateral Form No. ER-SWM-102)	"Additional Bond" - To be submitted with any bond which will increase the total amount of bond of an existing permit. The additional amount of bond will be applied to the entire permit area and will be retroactively effective from date of issuance of original permit. This must be submitted with one of the basic bond forms referred to above.
2. Surety and Collateral (Surety Form No. ER-SWM-113, Collateral Form No. ER-SWM-103)	"Transfer of Permit" - Required for transfers of permit responsibility to a new operator who must assume liability accrued on the former operator's permit area. This must be submitted with one of the basic bond forms referred to above.
3. Surety and Collateral (Surety Form No. ER-SWM-114, Collateral Form No. ER-SWM-104)	"Replacement Bond" - Required when an operator replaces existing bonds with new bonds. This must be submitted with one of the basic bond forms referred to above. Example: Operator wants to replace certificates of deposit with a surety bond.
4. Surety and Collateral (Surety Form No. ER-SWM-115, Collateral Form No. ER-SWM-105)	"Pre-Existing Liability" - Required when an operation (or activity) was conducted prior to the issuance of a permit in order to cover all conditions in the permit area whether created before or after issuance of a permit. This must be submitted with one of the basic bond forms referred to above.

5.	Collateral (Collateral Form No. ER-SWM-106	"Partial Replacement Bond" - Used when an operator wishes to replace one or more pieces of collateral already on deposit with DER. This does not require the submission of a new collateral bond form but is instead added to the existing bond on deposit with DER. Example: Operator wants to replace municipal bond "A" (which matured) with a new municipal bond from the collateral bond which contained municipal bonds A, B and C.
6.	Collateral (Collateral Form No. ER-SWM-107)	"Assignment of Certificate of Deposit" - Required with every certificate of deposit (certificates of deposit, saving certificates, money market certificates, etc.). This form will assign the certificate to the Commonwealth, and provides the waiver of the bank's rights to the money on deposit.
7.	Collateral (Collateral Form No. ER-SWM-108)	"Schedule for Deposit of Collateral" - With an initial bond deposit, the operator submits a signed schedule agreeing to submit predetermined amounts of collateral on an approved time schedule. The form will be used for "phased deposits of collateral" and "surety/collateral combination bond".

BOND FORMS
AND
BOND ENDORSEMENT FORMS

1. Form No. ER-SWM-101 Collateral Bond for Hazardous Waste Facility
2. Form No. ER-SWM-102 Collateral Bond Endorsement - Additional Bond
3. Form No. ER-SWM-103 Collateral Bond Endorsement - Transfer of Permit
4. Form No. ER-SWM-104 Collateral Bond Endorsement - Replacement Bond
5. Form No. ER-SWM-105 Collateral Bond Endorsemment - Pre-Existing Liability -
6. Form No. ER-SWM-106 Collateral Bond Endorsemment - Partial Replacement Bond
7. Form No. ER-SWM-107 Assignment of Certificate of Deposit
8. Form No. ER-SWM-108 Schedule for Deposit of Collateral
9. Form No. ER-SWM-111 Surety Bond for Hazardous Waste Facility
10. Form No. ER-SWM-112 Surety Bond Endorsement - Additional Bond
11. Form No. ER-SWM-113 Surety Bond Endorsement - Transfer of Permit
12. Form No. ER-SWM-114 Surety Bond Endorsement - Replacement Bond
13. Form No. ER-SWM-115 Surety Bond Endorsement - Pre-Existing Liability

(See attached ER-SWM-109 Instructions for Submission of Certificates of Deposit for completing Form No. ER-SWM-107 Assignment of Certificate of Deposit).

(See atttached ER-SWM-110 Instructions for Submission of Negotiable Government Securities for proper submittal of this type of collateral)

ER—SWM—101:3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

COLLATERAL BOND FOR HAZARDOUS WASTE FACILITY

Purpose: Check One

(1) Operation and Closure of a Hazardous Waste Facility

☐ (a) Original Application for Permit

☐ (b) Additional Bond

☐ (c) Replacement Bond

(2) ☐ Closure of a Hazardous Waste Facility

To be filled in by Pennsylvania Department of Environmental Resources:

Permit No. ____________________

Date of Permit Issuance ____________________

Date(s) and Amount of Bond Release

____

____

To be filled in by Operator:

Name of Facility ____________________

____

E.P.A. I.D.# ____________________

Type of Facility: Storage ☐ Treatment ☐ Disposal ☐

WHEREAS, ____________________,
(Name of Facility Operator)

a (1) Corporation, incorporated under the laws of the State of

____________________, or

(2) ____________________,
(Partnership, Individual, Registered Fictitious Name Business)

with its principal place of business at ____________________
(Address of Facility Operator)

(hereinafter the "operator"), has filed an application for a permit or executed an agreement with the Department of Environmental Resources, under the provisions of the Act of Assembly, approved July 7, 1980, P.L. 380, as amended, known as the "Solid Waste Management Act" (hereinafter "Act 97"), for the purpose, as indicated above, of either (1) the operation and closure, or (2) the closure of a hazardous waste facility in ____________________ Township, ____________________ County, of the Commonwealth of Pennsylvania.

NOW THEREFORE, KNOW ALL MEN BY THESE PRESENTS that the operator, intending to be legally bound, is held and firmly bound unto the Department in the just and full sum of ____________________ ($ ____________________) Dollars, to the payment whereof, well and truly to be made, the operator does hereby bind itself, its heirs, executors, administrators, assigns and successors firmly by these presents:

NOW THE CONDITION OF THIS OBLIGATION is such that if the operator faithfully performs all the requirements of (1) Act 97; (2) the Act of Assembly approved June 22, 1937, P.L. 1987, as amended, known as "The Clean Streams Law" (3) the Act of Assembly approved January 8, 1960, P.L. 2119, as amended, known as the "Air Pollution Control Act", (4) the applicable provisions of the Act of Assembly approved November 26, 1978, P.L. 1375, as amended known as the "Dam Safety and Encroachments Act"; (5) the applicable provisions of the Act of Assembly approved May 31, 1945, P.L. 1198, as amended, known as the "Surface Mining Conservation and Reclamation Act"; (6) the rules and regulations promulgated thereunder; (7) the provisions and conditions of the permits issued thereunder; (8) orders of the Department; and (9) such amendments or additions to the acts, regulations, terms and conditions of the permits and orders of the Department as may hereinafter be lawfully made (all of which are hereinafter referred as the "law"), then this obligation shall be null and void, otherwise to be and remain in full force and effect.

LIABILITY UPON THIS BOND shall be for the full amount specified herein. Liability upon this bond shall continue for the duration of the operation of the hazardous waste facility, final closure of the facility and for a period of ________________ years thereafter, unless released in whole or in part by the Department, in writing, prior thereto as provided by the law.

FOR THE PURPOSE OF SECURING SAID OBLIGATION, the operator hereby deposits the following collateral as required by the law.

DESCRIPTION OF COLLATERAL

A) Negotiable Securities

Name of Issue & Bond No.	Face Value	Market Value
________________	__________	________________
________________	__________	________________
________________	__________	________________
	Sub Total:	________________

B) Certificates of Deposit, Savings Certificates, or Bank Irrevocable Letters of Credit

Bank	No.	Amount
	Sub Total:	

C) Cash, Certified Check, Cashier's Check, Treasurer's Check

Bank	Check No.	Amount
	Sub Total:	

Total Amount of Collateral: ______________________________

If the Department has authorized a schedule (attached to this bond), to deposit the collateral required to secure this Bond Obligation, the operator agrees tomake such deposits in strict conformity with such schedule as a supplement to such amounts already deposited with the Department. Failure to promptly deposit collateral in accordance with the schedule shall immediately result in the acceleration of the obligation to deposit the full remaining amount of collateral and such other penalties as may be imposed by the Department.

The Secretary of the Department shall, upon receipt of deposits of collateral, place the same with the State Treasurer, who shall receive and hold the same in the name of the Commonwealth as provided by the law. Where negotiable securities deposited as collateral mature or are called, the State Treasurer, at the request of the operator shall convert such securities into other acceptable securities as may be designated by the operator. The operator hereby nominates, constitutes and appoints the State Treasurer its attorney in fact for the purpose of endorsing and converting said securities, for purposes of exchange of collateral or in the event of forfeiture of this bond.

UPON THE HAPPENING OF ANY DEFAULT of the provisions, conditions and obligations assumed under this bond and a declaration of forfeiture by the Secretary of the Department, or his designee, the operator hereby authorizes and empowers the State Treasurer to convert the said collateral and deposit the proceeds to the account of the Department as provided by the law. If the operator has failed to deposit the full amount of collateral necessary to secure this obligation, after written demand of the Department, THE OPERATOR HEREBY EXPRESSLY AUTHORIZES AND EMPOWERS THE ATTORNEY GENERAL OF THE COMMONWEALTH OF PENNSYLVANIA, OR ANY OTHER ATTORNEY OF ANY COURT OF RECORD IN PENNSYLVANIA, OR ELSEWHERE, BY HIM DEPUTIZED FOR THE PURPOSE, TO APPEAR FOR AND CONFESS JUDGMENT AGAINST THE OPERATOR, ITS SUCCESSORS OR ASSIGNS in favor of the Commonwealth for any sum of money which may be due hereunder, with or without defalcation or declaration filed, with interest from the date of written demand calculated at 10% per annum, and costs, with release of errors, without stay of execution AND WITH TEN PERCENT (10%) ADDED FOR COLLECTION FEES, and for the exercise of this power this instrument or a copy thereof, any rule of court to the contrary notwithstanding, shall be full warrant and authority. This power shall be inexhaustible.

FURTHER, the operator agrees that its liability hereunder shall not be impaired or affected by (a) any renewal or extension of the time for performance of any of the provisions, conditions or obligations under this bond, or (b) any forbearance or delay in declaring this bond forfeit or in collecting on this bond.

FURTHER, the Department reserves the right to require additional bond amounts from the operator, for any reason, which shall be a supplement to the liability under this bond. The Department may release, in writing, a portion of the amounts deposited to secure this obligation for partial completion of the provisions, conditions and obligations assumed by the operator herein, as may be authorized by the law, and such amount released shall be a credit upon the total amount of this bond. Nothing herein shall limit or preclude the Department from seeking any liability or remedy, in addition to the forfeiture of this bond, which may be authorized or provided for by the law.

IN WITNESS WHEREOF, the operator hereunto sets its hand and seal, intending to be legally bound hereby, this ______________ day of __________________________ 19 ___ .

OPERATOR ______________________________
(Print Name of Facility Operator)

ATTEST OR WITNESS

____

By:______________________________
(Signature & Title)

____

By:______________________________
(Signature & Title) (Seal)

Approved as to legality and form:

____
Office of Attorney General

____
Chief/Assistant Counsel
Department of Environmental Resources

Approved for the Department:

____
Bureau of Waste Management

ER—SWM—102:3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

COLLATERAL BOND ENDORSEMENT

Additional Bond

This endorsement is attached and made a part of a Collateral Bond dated ____________ submitted pursuant to Permit No. __________________, issued on __________________ (original permit date).
It is agreed and understood that the attached Collateral Bond assumes and covers any and all liability and obligations accrued and to be accrued under the law (as defined in the attached bond), from the date of the issuance of the original permit until such time as the Commonwealth shall release, in writing, such liability and obligations, as a supplement to all prior bonding deposited and to be deposited for the aforesaid permit. It is specifically agreed and intended that the aforesaid additional Collateral Bond is retroactively effective from the date of the issuance of the original permit.

IN WITNESS WHEREOF, the Permittee, intending to be legally bound hereby signs, seals and delivers this Endorsement, this __________ day of __________________________, 19____.

ATTEST OR WITNESS

Permittee

____
(Print Name)

____

By: ______________________________
(Title) (Seal)

____

By: ______________________________
(Title) (Seal)

ER–SWM–103:3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

COLLATERAL BOND ENDORSEMENT

Transfer of Permit

This Endorsement is attached to and made a part of a Collateral Bond dated ______________ submitted as bond required by and pursuant to Permit No. __________________, to replace ____ bond(s) pledged and deposited with the Common-
(surety or collateral)
wealth by ____ pursuant to Permit No. (s)
(name of former permittee)
____ issued on
(original Permit No.)
____ .
(original permit(s) date)

The undersigned Permittee hereby assumes, as a condition upon the attached Collateral Bond, any and all liability and obligations accrued on the original permit and to be accrued on the new permit under the law (as defined in the attached bond) from the date of the issuance of the original permit until such time as the Commonwealth shall release, in writing, such liability and obligations. It is specifically agreed and intended that the attached Collateral Bond is retroactively effective from the date of the issuance of the original permit.

It is understood that the Commonwealth, in consideration of the pledge and deposit of the attached Collateral Bond, will release the existing bonds of the former Permittee.

IN WITNESS WHEREOF, the Permittee, intending to be legally bound hereby, signs, seals and delivers this Endorsement, this ______________ day of ___________________________ , 19____ .

ATTEST OR WITNESS

PERMITTEE

____
(Print Name)

____ By: ______________________________________
(Title) (Seal)

____ By: ______________________________________
(Title) (Seal)

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

COLLATERAL BOND ENDORSEMENT

Replacement Bond

This Endorsement is attached to and made a part of a Collateral Bond dated ______________ submitted pursuant to Permit No. ____, issued on __________________________________. It is agreed and understood that the attached
(original permit date)
Collateral Bond assumes and covers any and all liability and obligations accrued and to be accrued under the law (as defined in the attached bond), from the date of the issuance of the original permit until such time as the Commonwealth shall release, in writing, such liability and obligations. It is specifically agreed and intended that the aforesaid replacement Collateral Bond is retroactively effective from the date of the issuance of the original permit.

It is agreed and understood that the attached Collateral Bond replaces existing ______________________________________ bond(s) dated ____________________________,
(collateral or surety)
and that in consideration of the pledge and deposit of the attached Collateral Bond, the Commonwealth will release the existing bond(s) of Permittee.

IN WITNESS WHEREOF, the Permittee intending to be legally bound hereby, signs, seals and delivers this Endorsement, this __________ day of __________________________, 19 ____ .

ATTEST OR WITNESS

PERMITTEE

____
(Print Name)

____

By: ____________________________________
(Title) (Seal)

____

By: ____________________________________
(Title)

ER—SWM—105:3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

COLLATERAL BOND ENDORSEMENT

Pre-existing Liability

It is agreed and understood by the Permittee on the Collateral Bond, dated ____________________, 19 ____, to which this Endorsement is attached and intended to become a part of, that said bond covers and includes any and all liability and obligations under the law (as defined in the attached bond) which accrued on the permit site prior to the issuance of Permit No. ________________, at any time and created by anyone, as well as any and all liability and obligations to be accrued under the law from the date of the issuance of the Permit until such time as the Commonwealth shall release, in writing, such liability and obligations. It is specifically agreed and intended that the aforesaid Collateral Bond is retroactively effective.

IN WITNESS WHEREOF, the Permittee, intending to be legally bound hereby, signs, seals and delivers this Endorsement, this ________ day of ____________________, 19 ____ .

ATTEST OR WITNESS:

PERMITTEE

____
(Print Name)

______________________________ By: ______________________________
(Title) (Seal)

______________________________ By: ______________________________
(Title)

ER–SWM–106:3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

COLLATERAL BOND ENDORSEMENT

Partial Replacement Bond

This Endorsement is attached to and made a part of the Collateral Bond dated ____________ submitted pursuant to Permit No. __________________________, issued on ______________________________ .
(Original permit date)

The Permittee hereby agrees to deposit the following collateral

	Name	*Amount*	*Market Value*
1.			
2.			
3.			

to replace collateral on deposit with the Department of Environmental Resources pursuant to the aforesaid Collateral Bond and described as follows:

	Name	*Amount*	*Market Value*
1.			
2.			
3.			

The replacement collateral shall cover any and all liability and obligations accrued and to be accrued under the law (as defined in the aforesaid bond) from the date of the issuance of the original permit until such time as the Department shall release, in writing, such liability and obligations. In consideration of the pledge and deposit of the replacement collateral, the Department will release the replaced collateral identified above.

IN WITNESS WHEREOF, the Permittee intending to be legally bound hereby, signs, seals and delivers this Endorsement, this ________ day of ____________________, 19 ___ .

ATTEST OR WITNESS

PERMITTEE

____
(Print Name)

__________________________________ By: __________________________________
(Title) (Seal)

__________________________________ By: __________________________________
(Title)

ER–SWM–107: 3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

(Submit in Triplicate)

Permit No. ______________
(Dept. Use Only)

ASSIGNMENT OF CERTIFICATE OF DEPOSIT

THIS AGREEMENT is made this __________ day of ________________, 19 ____, by and among the Commonwealth of Pennsylvania, Department of Environmental Resources, hereinafter referred to as the "Commonwealth";

AND

____, a
(Name of Permittee)

(a) corporation, incorporated under the laws in the State of ______________________, or a(n)

(b) ____
(Partnership, Individual, Registered Fictitious Name Business)

with its principal place of business at ____

____, hereinafter referred to as the "Permittee":

AND

______________________________, a bank (or banking institution) chartered or otherwise authorized
(Name of Bank)

to do business in the Commonwealth of Pennsylvania with its principal place of business at ____, hereinafter referred to as the "Bank".

WHEREAS, the Permittee desires to assign and pledge the following Certificate(s) of Deposit issued by the Bank in the amounts indicated and any renewals thereof, hereinafter referred to as "CD's";

	CD No.	Date of Issue	Amount	Maturity
1.	______	______	______	______
2.	______	______	______	______
3.	______	______	______	______
4.	______	______	______	______

to the Commonwealth, as collateral to guarantee the Permitee's legal obligations as provided in the Collateral Bond Agreement which is attached hereto and made a part hereof; and

WHEREAS, THE Bank desires to act as the custodian for the benefit of the Commonwealth of the moneys represented by the aforesaid CD's and subject to the terms and conditions contained herein.

NOW, THEREFORE, the parties hereto, intending to be legally bound hereby, agree as follows:

1. The Permittee assigns and pledges the aforesaid CD's and any renewals thereof, to the Commonwealth as collateral, to guarantee the Permittee's legal obligations as provided in the attached Collateral Bond Agreement.

2. The Permittee hereby authorizes the Commonwealth to withdraw any portion or all of the moneys on deposit with the Bank pursuant to the aforesaid CD's, at any time and from time to time upon default of any of the obligations provided or referred to in the attached Collateral Bond Agreement.

3. The Permittee hereby authorizes the Bank, upon written demand by the Commonwealth, to pay to the Commonwealth any portion or all of the moneys on deposit with the Bank pursuant to the aforesaid CD's at any time and from time to time, without further notice to, consent of or endorsement by the undersigned Permittee.

4. The Permittee does hereby agree, represent and warrant that, except as assigned and pledged herein, the aforesaid CD's and the moneys thereby represented have not nor will be sold, assigned, transferred, pledged or promised as a security interest in any manner whatsoever without written consent of the Commonwealth and that the aforesaid CD's are assigned and pledged herewith free and clear of any and all liens, encumbrances, pledges, restrictions, security interests and agreements.

5. The Bank hereby acknowledges the assignment and pledge of the aforesaid CD's to the Commonwealth and agrees to record the assignment upon the back of the CD's and upon the books of the Bank. Further, the Bank acknowledges and agrees that it shall hold the moneys represented by the CD's as a custodian and agent for the Commonwealth and shall be liable to the Commonwealth for any and all losses to the principal amount(s) of the aforesaid CD's caused in any manner whatsoever during the term of this Agreement. THE BANK EXPRESSLY AGREES TO WAIVE ANY AND ALL RIGHTS OR OBLIGATIONS, INCLUDING THOSE UNDER FEDERAL AND STATE LAW, TO DEDUCT ANY PENALTY FOR WITHDRAWAL BY THE COMMONWEALTH PRIOR TO MATURITY FROM THE PRINCIPAL AMOUNT OF THE CD'S IF SUCH DEDUCTION WOULD REDUCE THE AMOUNT OF COLLATERAL ASSIGNED AND PLEDGED TO THE COMMONWEALTH TO AN AMOUNT WHICH IS INSUFFICIENT TO SATISFY, IN FULL, THE BOND OBLIGATION AS PROVIDED IN THE ATTACHED COLLATERAL BOND. THE BANK EXPRESSLY ASSUMES THE RESPONSIBILITY TO DESIGN THE CD'S SO THAT NO SUCH PENALTY CAN BE ASSESSED AGAINST THE COMMONWEALTH'S RIGHTS TO THE AFORESAID CD'S.

6. The Bank hereby waives, for the duration of this Assignment, all rights of setoff or liens or any other claims which it now has or might, in the future, have against the aforesaid CD's or the deposited moneys upon which the certificate(s) were issued. Any conditions pertaining to said CD's to the contrary are hereby expressly rescinded.

7. The Bank hereby agrees to: (a) renew automatically said certificate(s) for the same term as that for which it or they were originally issued, (b) collect, from time to time, all interest on the certificate(s) and pay the same, when and as collected, as agent for the Commonwealth, to the depositor named in the certificate(s) or otherwise as required in writing by the Commonwealth, and (c) upon receipt from the Commonwealth of a notice of forfeiture pertaining to the attached Collateral Bond Agreement, collect and hold for the benefit of the Commonwealth all interest that may accrue on the Collateral from the date of receipt of the notice of forfeiture.

8. The Bank and the Permittee agree that any delay by the Commonwealth in enforcing its rights to the aforesaid CD's pursuant to the attached Collateral Bond Agreement shall not affect the Commonwealth's rights in the CD's.

9. The Commonwealth agrees that the aforesaid CD's may be replaced by other certificate(s) of deposit or other security acceptable to the Department PROVIDED HOWEVER that such replacement must be deposited and accepted in writing by the Commonwealth first, and until such written acceptance the aforesaid CD's shall remain assigned and pledged in full force and effect, to the Commonwealth.

10. This Agreement shall terminate upon written release by the Commonwealth.

11. This Agreement may be changed only by written instrument signed by the Commonwealth.

12. This Assignment is made in and shall be governed by and construed in accordance with the laws of the Commonwealth of Pennsylvania.

IN WITNESS WHEREOF, the parties hereto have set their hands and seals, intending to legally bind themselves, their heirs, successors, assigns and transferees, the day and year first written above.

____
(Print Name of Permittee)

ATTEST:

_______________________________ By: _______________________________
(Signature & Title) (Seal)

_______________________________ By: _______________________________
(Signature & Title)

____
(Print Name of Bank)

ATTEST:

_______________________________ By: _______________________________
(Signature & Title) (Seal)

_______________________________ By: _______________________________
(Signature & Title)

Approved as to legality and form:

____
Office of Attorney General

____
Chief/Assistant Counsel
Department of Environmental Resources

Approved for the Department:

____
(Bureau)

ACKNOWLEDGEMENT OF INDIVIDUALS OR PARTNERS
(Permittee)

STATE OF ______________________________ :
COUNTY OF ____________________________ : ss

On ____________________, before me, the undersigned officer, personally appeared ____

[Name(s) and Title(s)]

known to me (or satisfactorily proven) to be the person(s) whose name(s) subscribed to the within instrument, and acknowledged that ____ executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

(SEAL) ________________________ My Commission Expires: ________________________
Notary Public (Date)

ACKNOWLEDGEMENT OF CORPORATIONS
(Permittee)

STATE OF ______________________________ :
COUNTY OF ____________________________ : ss

On __________________, before me, the undersigned officers, personally appeared ____________________________________ and ____________________________________, who acknowledged themselves to be the ______________________________________ and
(Title of Person)

______________________________ of ______________________________, a corporation,
(Title of Person) (Name of Corporation)

and that they as such officers being authorized to do so, executed the foregoing instrument on behalf of the said corporation.

IN WITNESS WHEREOF, I have hereunder set my hand and official seal.

(SEAL) ________________________ My Commission Expires: ________________________
Notary Public (Date)

ACKNOWLEDGEMENT OF BANK

STATE OF ______________________________ :
COUNTY OF ____________________________ : ss

On __________________, before me, the undersigned officers, personally appeared ____________________________________ and ____________________________________, who acknowledged themselves to be the ______________________________________ and
(Title of Person)

________________________ of ________________________, a bank, and that they as
(Title of Person) (Name of Bank)

such officers, being authorized to do so, executed the foregoing instrument on behalf of the said bank.

IN WITNESS WHEREOF, I have hereunder set my hand and official seal.

(SEAL) ________________________ My Commission Expires: ________________________
Notary Public (Date)

ER—SWM—108:3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

SCHEDULE FOR DEPOSIT OF COLLATERAL

This schedule is attached to and made a part of a Collateral Bond obligation, dated ______________________________ submitted pursuant to Permit No. ____________________ by ______________________________ (Name of Permittee) ______________________________.

For the purpose of securing the aforesaid bond obligation, the permittee hereby agrees, intending to be legally bound hereby, to deposit collateral, acceptable to the Department, in accordance with the following schedule. Time is of the essence. It is the responsibility of the permittee to make timely deposits in accordance with this schedule. The Commonwealth is not responsible to give the permittee further notice of this schedule of deposits.

	Amount of collateral to be deposited	*Date to be deposited*
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

The total amount of collateral to be deposited in accordance with this schedule is ____________________.

IN WITNESS WHEREOF, the permittee hereunto sets its hand and seal, intending to be legally bound hereby, this __________ day of ______________________________, 19 _______ .

PERMITTEE

____
(Print Name)

ATTEST OR WITNESS

______________________________ By: ______________________________
(Title)

______________________________ By: ______________________________
(Title) (Seal)

Approved as to legality and form:

____
Office of Attorney General

____
Chief/Assistant Counsel
Department of Environmental Resources

Approved for the Department:

____
(Bureau)

ER—SWM—109:3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

INSTRUCTIONS FOR SUBMISSION OF CERTIFICATES OF DEPOSIT

I. Only Pennsylvania bank (or Savings and Loan Association) Certificates of Deposit and Saving Certificates shall be acceptable, not "Passbook Accounts".

II. Certificates must be in the name of the Permittee, not third parties.

III. The denomination of individual certificates shall not exceed the maximum F.D.I.C. or F.S.L.I.C. insured amount (currently $100,000).

IV. The assignment by the Permittee and the acknowledgement by the Bank shall be completed and signed on the back of the certificate in substantially the following manner:

Pursuant to the assignment of Certificate of Deposit Agreement; dated ________________ which is hereby incorporated by reference;

Certificate No. ________________________ is assigned to the Commonwealth of Pennsylvania, Department of Environmental Resources.

____
(Name of Permittee)

By: ____________________________________
(Signature and Title)

The ________________________________ approves the assignment of Certificate No. __________
(Name of Bank)

to the Commonwealth of Pennsylvania, Department of Environmental Resources and has recorded the assignment upon the books of the Bank.

____
(Name of Bank)

By: ____________________________________
(Signature and Title)

V. The bank shall machine authenticate the dollar amount of the Certificate on the front of the Certificate.

VI. The Permittee and the bank shall execute an Assignment of Certificate of Deposit, Form No. ER-SWM-107, in triplicate, the major provisions of which provide:

A. The bank expressly agrees to waive any and all rights or obligations, including those under federal and state law, to deduct any penalty for withdrawal prior to maturity from the principal amount of the Certificates of Deposit if such deduction would reduce the amount of collateral assigned and pledged to the Commonwealth to an amount which is insufficient to satisfy, in full, the bond obligation. The bank expressly assumes the responsibility to design the Certificates of Deposit so that no such penalty can be assessed against the Commonwealth's rights to the aforesaid Certificates.

Several acceptable methods to resolve this problem are:

(1) Make the Certificate an accumulating growth Certificate with interest deposited in the Certificate account and retained until presentment for payment.

(2) Deposit more money in the Certificate account than is required for the bond obligation.

(3) Specifically agree in writing on the Certificate that any penalty will be taken out of other depository accounts of the mine operator.

(4) Such other methods as may be specifically agreed to by the Department.

B. Certificates shall be automatically renewable for the same term as the original.

C. Certificates shall not be pledged to anyone else to secure any other obligation, past, present and future.

D. The bank shall waive all rights of setoff against certificates for any and all obligations of the Permittee, past, present and future during the term of the assignment.

E. Certificates may be replaced with other certificates of deposit or other security authorized under the Law PROVIDED HOWEVER that such replacement must be deposited and accepted in writing by the Commonwealth first and until such written acceptance, the certificates shall remain assigned and pledged to the Commonwealth in full force and effect.

VII. The executed Assignment of Certificate of Deposit shall be submitted with and form a part of the Collateral Bond Agreement Form No. ER-SWM-107 to be executed by the Permittee.

VIII. A permit will not be issued until the Certificate of Deposit, Assignment and Collateral Bond Agreement are reviewed and approved by DER Legal Counsel and the Department.

IX. The assignment agreement must be signed by two corporate officers of the bank. At least one officer from each of the following two categories must execute the agreement on behalf of the bank: Category a) President, Vice President, or Assistant Vice President; and Category b) Treasurer, Secretary, Cashier, Assistant Treasurer, Assistant Secretary, or Assistant Cashier.

ER—SWM—110:3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

INSTRUCTIONS FOR SUBMISSION OF NEGOTIABLE GOVERNMENT SECURITIES

INTRODUCTION

Negotiable government securities acceptable for submission with a collateral bond fall into two (2) categories:
- (A) ***Bearer instruments,*** payable to bearer; and
- (B) ***Registered (non-bearer) instruments,*** payable to a certain named person.

These guidelines apply to both categories of instruments, unless otherwise noted.

I. Negotiable instruments of the following government issuers and acceptable:
- (A) the United States of America;
- (B) the Commonwealth of Pennsylvania;
- (C) the Pennsylvania Turnpike Commission;
- (D) the General State Authority;
- (E) the State Public School Building Authority; or
- (F) any Commonwealth municipality.

II. The Commonwealth will obtain possession of and keep in custody all negotiable instruments deposited as collateral by the permittee until authorized for release or replacement as provided in applicable DER regulations and guidelines.

III. DER will value such instruments at their current market value, not face value.

IV. The trustee bank shall machine authenticate the dollar amount of the negotiable instrument on the front of the instrument.

V. The negotiable instrument shall be submitted with the Collateral Bond Form No. ER-SWM-101 to be executed by the permittee.

VI. Registered negotiable instruments must be payable in the name of the permittee, and not in the names of third parties.

VII. Negotiable instruments payable to "bearer" may be assigned to the Commonwealth merely by delivery. As for ***registered*** negotiable instruments, the assignment by the permittee shall be completed and signed on the back of the registered negotiable instrument in substantially the following manner:

> "FOR VALUE RECEIVED, the undersigned hereby sells, assigns, and transfers unto the Commonwealth of Pennsylvania, Department of Environmental Resources the within bond and all rights thereunder, and hereby irrevocably constitutes and appoints the State Treasurer attorney to transfer the said bond on the books of the within named Trustee, with full power of substitution in the premises.

Dated ____________________

____________________ (Seal)

____

____________________"

SPECIAL INSTRUCTIONS FOR COMPLETING ASSIGNMENT OF REGISTERED NEGOTIABLE INSTRUMENT

- (A) The assignment should be executed as indicated by the operator.
  - (i) For a corporation, the corporate name should be indicated and execution by either the President or Vice-President ***and*** the Secretary or Treasurer should be obtained;
  - (ii) For a partnership, the partnership name should be indicated, and execution by all partners should be obtained.
- (B) The execution must be dated.
- (C) ***All*** signatures on the assignment must be certified as to their authenticity prior to submission to the Commonwealth; such certification is usually done by stamp of the operator's local bank.

VIII. A permit will not be issued until the negotiable instrument and Collateral Bond have been reviewed and approved as to legality and form by DER Legal Counsel and the Department.

ER–SWM–111: Rev. 7/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

SURETY BOND FOR HAZARDOUS WASTE FACILITY

Purpose, check one:

(1) Operation and Closure of a Hazardous Waste Facility

☐ (a) Original Application for Permit

☐ (b) Additional Bond

☐ (c) Replacement Bond

☐ (2) Closure of a Hazardous Waste Facility

To be filled in by Operator:

Name of Facility ______________________

____

E.P.A. I.D. # ______________________

Type of Facility: Storage ☐

Treatment ☐ Disposal ☐

To be filled in by Pennsylvania Department of Environmental Resources:

Permit No. ______________________

Date of Permit Issuance ______________________

Date(s) and Amount of Bond Release

____

____

To be filled in by Surety Company:

Bond No. ______________________

WHEREAS, ______________________ ,
(Name of Facility Operator)

a (1) Corporation, incorporated under the laws of the State of

______________________ , or

(2) ______________________ ,
(Partnership, Individual, Registered Fictitious Name Business)

with its principal place of business at ______________________

______________________ (hereinafter the ''operator''), has filed an
(Address of Facility Operator)

application for a permit or executed an agreement with the Department of Environmental Resources, under the provisions of the Act of Assembly, approved July 7, 1980, P.L. 380, as amended, known as the ''Solid Waste Management Act'' (hereinafter ''Act 97''), for the purpose, as indicated above of either (1) the operation and closure, or (2) the closure of a hazardous waste facility in ______________________ Township, ______________________ County, of the Commonwealth of Pennsylvania.

NOW THEREFORE, KNOW ALL MEN BY THESE PRESENTS that the operator, as principal, and

____, (hereinafter the "surety")
(Name of Surety Company)

licensed to do business in the Commonwealth of Pennsylvania, and approved by the Secretary of the Department of Environmental Resources, Commonwealth of Pennsylvania (hereinafter referred to as the "Secretary" and the "Department"), with its principal place of business at

____,
(Address)

as surety, in consideration of the issuance of the aforesaid permit and intending to be legally bound hereby, are held and firmly bound unto the Department, in the just and full sum of ______________________________ ($ ______________) Dollars, to the payment whereof, well and truly to be made, we bind ourselves, our heirs, executors, administrators, assigns and successors, individually and/or jointly, firmly by these presents:

NOW THE CONDITION OF THIS OBLIGATION is such that if the principal shall faithfully perform all of the requirements of (1) Act 97; (2) the Act of Assembly approved June 22, 1937, P.L. 1987, as amended, known as "The Clean Streams Law"; (3) the Act of Assembly approved January 8, 1960, P.L. 2119, as amended, known as the "Air Pollution Control Act"; (4) the applicable provisions of the Act of Assembly approved November 26, 1978, P.L. 1375, as amended, known as the "Dam Safety and Encroachments Act;" (5) the applicable provisions of the Act of Assembly approved May 31, 1945, P.L. 1198, as amended, known as the "Surface Mining Conservation and Reclamation Act"; (6) the rules and regulations promulgated thereunder; (7) the provisions and conditions of the permits issued thereunder; (8) orders of the Department; and (9) such amendments or additions to the acts, regulations, terms and conditions of the permits and orders of the Department as may hereafter be lawfully made (all of which are hereinafter referred to as the "law"), then this obligation shall be null and void, otherwise to be and remain in full force and effect.

LIABILITY UPON THIS BOND shall be for the full amount specified herein. Liability upon this bond shall continue for the duration of the operation of the hazardous waste facility, final closure of the facility and for a period of ____________ years thereafter, unless released in whole or in part by the Department, in writing, prior thereto as provided by the law.

UPON THE HAPPENING OF ANY DEFAULT of the provisions, conditions and obligations assumed under this bond and within thirty (30) days of the notice of forfeiture by the Secretary, or his designee, to the principal and surety, the principal and the surety hereby authorize and empower the Attorney General of the Commonwealth of Pennsylvania, or any other attorney of any court of record in Pennsylvania, or elsewhere, by him deputized for the purpose, to appear for and confess judgment against the principal and/or the surety, their successors or assigns, in favor of the Commonwealth for any sum of money which may be due hereunder, with or without defalcation or declaration filed, with interest from the date of written demand calculated at 10% per annum, and costs, with release of errors, without stay of execution AND WITH TEN PERCENT (10%) ADDED FOR COLLECTION FEES, and for the exercise of this power, this instrument, or a copy thereof, any rule of court to the contrary notwithstanding, shall be full warrant and authority. This power shall be inexhaustible within thrity (30) days of the notice of forfeiture.

FURTHER, the principal and the surety agree that their liability hereunder shall not be impaired or affected by (a) any renewal or extension of the time for performance of any of the provisions, conditions or obligations under this bond, or (b) any forbearance or delay in declaring this bond forfeited or in collecting on this bond. The surety hereby waives any right to cover or perform the obligations of the principal upon the principal's default; provided, however, that the Department may authorize, in writing, the surety to cover such defaulted obligations if the Department determines that it is in its interest to do so.

FURTHER, the Department reserves the right to require additional bond amounts from the principal, for any reason, which shall be a supplement to the liability under this bond. The Department may release, in writing, a portion of the amounts deposited to secure this obligation for partial completion of the provisions, conditions and obligations assumed by the principal herein, as may be authorized by the law, and such amount released shall be a credit upon the total amount of this bond. Nothing herein shall limit or preclude the Department from seeking any liability or remedy, in addition to the forfeiture of this bond, which may be authorized or provided for by the law.

FURTHER, the principal and surety agree that execution may issue upon judgment so confessed for the full amount of money and accrued interest that is owing from the principal and/or the surety to the Commonwealth, with costs and collection fee upon filing information in writing in the court where such judgment shall be entered.

IN WITNESS WHEREOF, the principal and surety have hereunto set their hands and seals, intending to be legally bound hereby, this ________________ day of ________________________, 19 ___ .

PRINCIPAL (FACILITY OPERATOR):

____
(Print Name)

ATTEST OR WITNESS

____

By: ______________________________
(Title)

____

By: ______________________________
(Title) (Seal)

SURETY: ______________________________
(Print Name)

ATTEST OR WITNESS:

____

By: ______________________________
(Title)

____

By: ______________________________
(Title) (Seal)

Approved as to legality and form:

____
Office of Attorney General

____
Chief/Assistant Counsel
Department of Environmental Resources

Approved for the Department:

____
(Bureau)

ER—SWM—112:3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

SURETY BOND ENDORSEMENT
ADDITIONAL BOND

It is agreed by the Principal and Surety, on Surety Bond No. ______________________, dated ________________, 19 _____, to which this Endorsement is attached and intended to become a part of, that said bond is submitted as an additional bond required by and pursuant to Permit No. ______________, originally issued on ______________ (Original date of issuance). The attached Surety Bond shall cover any and all liability accrued and to be accrued under the law (as defined in the attached bond), from the date of the issuance of the original permit until such time as the Commonwealth shall release, in writing such liability. The attached bond shall be a supplement to all other bonding posted or to be posted for the aforesaid permit. It is specifically intended that the attached Surety Bond will be retroactively effective.

IN WITNESS WHEREOF, the parties hereto, intending to be legally bound hereby, sign, seal and deliver this Endorsement, this ______________ day of ________________, 19 ______.

ATTEST OR WITNESS:

Principal: ______________________________
(Print Name) (Permittee)

______________________________ By: ______________________________
(Title) (Seal)

______________________________ By: ______________________________
(Title)

ATTEST OR WITNESS:

Surety: ______________________________
(Print Name)

______________________________ By: ______________________________
(Title) (Seal)

______________________________ By: ______________________________
(Title)

ER—SWM—113:3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

SURETY BOND ENDORSEMENT
Transfer of Permit

It is agreed and understood by the Prinicpal and Surety, on Surety Bond No. ____________, dated ______________________, 19 ____, to which this Endorsement is attached and intended to become a part of, that said bond is submitted as bond required by and pursuant to Permit No. ____________________________, to replace ____________________________ bond(s) pledged
(surety or collateral)
and deposited with the Commonwealth by ____
(name of former permittee)
pursuant to Permit No.(s) ____,
(original Permit No.)
issued on ____.
(original permit date)

The undersigned Principal and Surety hereby assume, as a condition upon the attached Surety Bond, any and all liability and obligations accrued on the original permit and to be accrued on the new permit under the law (as defined in the attached bond) from the date of the issuance of the original permit until such time as the Commonwealth shall release, in writing, such liability and obligations. It is specifically agreed and intended that the attached replacement Surety Bond is retroactively effective from the date of the issuance of the original permit.

It is understood that the Commonwealth, in consideration of the pledge and deposit of the attached replacement Surety Bond, will release the existing bonds of the former permittee.

IN WITNESS WHEREOF, the parties hereto, intending to be legally bound hereby, sign, seal and deliver this Endorsement, this __________________ day of __________________________, 19____.

ATTEST OR WITNESS:

Principal: ________________________________
(Print Name)

________________________________ By: ________________________________
(Title) (Seal)

________________________________ By: ________________________________
(Title)

ATTEST OR WITNESS:

Surety: ________________________________
(Print Name)

________________________________ By: ________________________________
(Title) (Seal)

________________________________ By: ________________________________
(Title)

ER–SWM–114:3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

SURETY BOND ENDORSEMENT

Replacement Bond

It is agreed and understood by the Principal and Surety, on Surety Bond No. ____________________, dated ______________________, 19 ____, to which this Endorsement is attached and intended to become a part of, that said bond is submitted as bond required by and pursuant to Permit No. ______________________, issued on ____ and that
(original permit date)
the attached Surety Bond assumes and covers any and all liability and obligations accrued and to be accrued under the law (as defined in the attached bond), from the date of the issuance of the original permit until such time as the Commonwealth shall release, in writing, such liability and obligations. It is specifically agreed and intended that the aforesaid replacement Surety Bond is retroactively effective from the date of the issuance of the original permit.

It is understood that the attached Surety Bond replaces existing __________________________
(collateral or surety)
bond(s) dated ______________________________, and that in consideration of the pledge and deposit of the attached Surety Bond, the Commonwealth will release the existing bond(s) of the permittee.

IN WITNESS WHEREOF, the parties hereto,intending to be legally bound hereby, sign, seal and deliver this Endorsement, this ______________ day of ____________________, 19____ .

ATTEST OR WITNESS:

Principal: ____________________________________
(Print Name)

____ By: ____
(Title) (Seal)

____ By: ____
(Title)

ATTEST OR WITNESS:

Surety: ____________________________________
(Print Name)

____ By: ____
(Title) (Seal)

____ By: ____
(Title)

ER—SWM—115:3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF SOLID WASTE MANAGEMENT

SURETY BOND ENDORSEMENT

Pre-existing Liability

It is agreed and understood by the Principal and Surety, on Surety Bond No. ____________, dated ______________________, 19 ____, to which this Endorsement is attached and intended to become a part of, that said bond covers and includes any and all liability and obligations under the law (as defined in the attached bond) which accrued at the permit site prior to the issuance of Permit No. ________________, at any time and created by anyone, as well as any and all liability and obligations to be accrued under the law (as defined in the attached bond) from the date of the issuance of the permit until such time as the Commonwealth shall release, in writing, such liability and obligations. It is specifically agreed and intended that the aforesaid Surety Bond is retroactively effective.

IN WITNESS WHEREOF, the parties hereto, intending to be legally bound hereby, sign, seal and deliver this Endorsement, this __________ day of ______________, 19 ____.

ATTEST OR WITNESS:

Principal: ______________________________
(Print Name)

______________________________ By: ______________________________
(Title) (Seal)

______________________________ By: ______________________________
(Title)

ATTEST OR WITNESS:

Surety: ______________________________
(Print Name)

______________________________ By: ______________________________
(Title) (Seal)

______________________________ By: ______________________________
(Title)

SPECIMEN

Wording for Irrevocable Letter of Credit

Note: Instructions and brackets are to be replaced with the relevant information and the brackets deleted.

[Name of Bank]

[Address]

IRREVOCABLE STANDBY LETTER OF CREDIT

[Date]

Commonwealth of Pennsylvania
Bureau of Solid Waste Management
Fulton Bank Building
P. O. Box 2063
Harrisburg, PA 17120

Gentlemen:

We hereby establish our Irrevocable Standby Letter of Credit No. ____________ in your favor, at the request and for the account of **[permittee's name and address]** up to the aggregate amount of **[in words]** U.S. dollars $____________, available by your drafts at sight.

This letter of credit shall be automatically renewed for additional terms of one (1) year unless the Bank gives at least ninety (90) days written notice to the Commonwealth of its intent to terminate the credit at the end of the current term. The Commonwealth of Pennsylvania shall have the right to draw upon this Letter of Credit up to the aggregate amount, less any prior drafts by the Commonwealth, and hold it as a cash collateral guarantee if **[permittee]** fails to replace this Letter of Credit with other acceptable collateral guarantees within thirty (30) days after the Bank gives its written notice to terminate the credit at the end of the current term.

The Bank will give notice to **[permittee]** and the Department of Environmental Resources within ten (10) days of any notice received or action filed alleging the insolvency or bankruptcy of the Bank, or alleging any violations of regulatory requirements which could result in suspension or revocation of the Bank's charter or license to do business.

Drafts must be drawn and negotiated not later than **[date, at least one year later than effective date of this Letter of Credit]**, or annually thereafter if the credit is not terminated as provided herein.

This Letter of Credit is subject to the Uniform Commercial Code (13 Pa. C.S. §§1101-9507).

[Signature and Title of Official of Issuing Institution]

SPECIMEN

Wording for Hazardous Waste Facility Certificate of Liability Insurance

Note: Instructions in brackets are to be replaced with the relevant information and the brackets deleted.

Hazardous Waste Facility Certificate of Liability Insurance

1. [Name of insurer], (the "Insurer"), of [address of Insurer] hereby certifies that it has issued liability insurance covering bodily injury and property damage to [name of insured], (the "Insured"), of [address of Insured] in connection with the Insured's obligation to demonstrate financial responsibility under 25 Pa. Code §75.301, et seq. The coverage applies at [list EPA identification number, name, and address for each facility] for [insert "sudden accidental occurrences," "non-sudden accidental occurrences," or "sudden and non-sudden accidental occurrences"; if coverage is for multiple facilities and the coverage is different for different facilities, indicate which facilities are insured for sudden accidental occurrences, which are insured for non-sudden accidental occurrences, and which are insured for both]. The limits of liability are [insert the dollar amount of the "each occurrence" and "annual aggregate" limits of the Insurer's liability], exclusive of legal defense costs. [If the Certificate of Liability Insurance is for an excess insurance policy, insert the following sentence: "$ ______ each occurrence and $ ______ annual aggregate in excess of the underlying limits of $ ______ each occurrence and $ ______ annual aggregate."] The coverage is provided under policy number ______, issued on [date] to satisfy the requirments of 25 Pa. Code, Chapter 75, Subchapter E. The effective date of said policy is [date], and the ending date of said policy is [date].

2. The Insurer further certifies the following with respect to the insurance described in Paragraph 1:

   a. Bankruptcy or insolvency of the Insured shall not relieve the Insurer of its obligations under the policy.

   b. The Insurer is liable for the payment of amounts within any deductible applicable to the policy, with a right of reimbursement by the Insured for any such payment made by the Insurer.

   c. Whenever requested by an official of the Department of Environmental Resources, the Insurer agrees to furnish to the Department of Environmental Resources a signed duplicate original of the policy and all endorsements.

   d. Cancellation of the insurance, whether by the Insurer or the Insured, will be effective only upon written notice and only after the expiration of one hundred twenty (120) days after a copy of such written notice is received by the Department of Environmental Resources.

   e. Any other termination of the insurance will be effective only upon written notice and only after the expiration of one hundred twenty (120) days after a copy of such written notice is received by the Department of Environmental Resources.

I hereby certify that the wording of this instrument is in compliance with the terms and provisions of 25 Pa. Code §75.334 as such regulation was constituted on the date first above written, and that the Insurer is licensed to transact the business of insurance, or eligible to provide insurance as an excess or surplus lines insurer, in Pennsylvania.

[Signature of Authorized Representative of Insurer]

[Type Name]

[Title] Authorized Representative of [Name of Insurer]

[Address of Authorized Representative]

S P E C I M E N

Wording for Hazardous Waste Facility Liability Endorsement

Note: Instructions in brackets are to be replaced with the relevant information and the brackets deleted.

Hazardous Waste Facility Liability Endorsement

1. This endorsement certifies that the policy to which the endorsement is attached provides liability insurance covering bodily injury and property damage in connection with the Insured's obligation to demonstrate financial responsibility under 25 Pa. Code §75.301, et seq. The coverage applies at [list EPA identification number, name, and address for each facility] for [insert "sudden accidental occurrences," "non-sudden accidental occurrences," or "sudden and non-sudden accidental occurrences"; if coverage is for multiple facilities and the coverage is different for different facilities, indicate which facilities are insured for sudden accidental occurrences, which are insured for non-sudden accidental occurrences, and which are insured for both]. The limits of liability are [insert the dollar amount of the "each occurrence" and "annual aggregate" limits of the Insurer's liability], exclusive of legal defense costs. [If the endorsement is for an excess insurance policy, insert the following sentence: "$______________ each occurrence and $______________ annual aggregate in excess of the underlying limits of $______________ each occurrence and $______________ annual aggregate."]

2. The insurance afforded with respect to such occurrences is subject to all the terms and conditions of the policy; provided, however, that any provisions of the policy inconsistent with Subsections a through e of this Paragraph 2 are hereby amended to conform with Subsections a through e:

   a. Bankruptcy or insolvency of the Insured shall not relieve the Insurer of its obligations under the policy to which this endorsement is attached.

   b. The Insurer is liable for the payment of amounts within any deductible applicable to the policy, with a right of reimbursement by the Insured for any such payment made by the Insurer.

   c. Whenever requested by an official of the Department of Environmental Resources, the Insurer agrees to furnish to the Department a signed duplicate original of the policy and all endorsements.

   d. Cancellation of this endorsement, whether by the Insurer or the Insured, will be effective only upon written notice and only after the expiration of one hundred twenty (120) days after a copy of such written notice is received by the Department of Environmental Resources.

   e. Any other termination of this endorsement will be effective only upon written notice and only after the expiration of one hundred twenty (120) days after a copy of such written notice is received by the Department of Environmental Resources.

Attached to and forming part of Policy No. ______________ issued by [Name of Insurer], herein called the Insurer, of [address of Insurer] to [name of Insured], herein called the Insured, of [address of Insured] this ______________ day of ______________, 19__. The effective date of said policy is [date], and the ending date of the policy is [date].

I certify that the wording of this endorsement is in compliance with the terms and provisions of 25 Pa. Code §75.334, as such regulation was constituted on the day first above written, and that the Insurer is licensed to transact the business of insurance, or eligible to provide insurance as an excess or surplus lines insurer, in Pennsylvania.

[Signature of Authorized Representative of Insurer]

[Type Name]

[Title] Authorized Representative of [Name of Insurer]

[Address of Authorized Representative]

HAZARDOUS WASTE DISPOSAL APPLICATION CHECKLIST FOR POST-CLOSURE CARE ACTIVITIES

5-30-85

GENERAL REQUIREMENTS - POST CLOSURE

For: Landfills
Surface Impoundments
Land Treatment
Waste Piles

Facility Name ______
ID Number ______
Facility Location ______

DRAFT

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. Part A Application for disposal facilities which are required to obtain a permit for post-closure care activities. Form ER-SWM-59	(265)(z)(11)					
2. Environmental Assessment Report-Module 9	(265)(z)(20)(i)(D)					
3. Compliance History Report-Module 10	(265)(z)(18)(v)					
4. Land Owner Consent Form	Act 97 Seq. 405					
5. Certification						
A. Registered Professional Engineer seal on all reports and design drawings	(265)(z)(19)					
B. Registered Professional Engineer seal and signature on title sheet	(265)(z)(19)					
C. Certification paragraph with responsible officials signature	(265)(z)(13)(iii)					
D. Signature of Principal Executive Officer or acceptable substitute	(265)(z)(13)(i)					
6. Application fee, check payable to Commonwealth of Pennsylvania	(265)(z)(26)					
A. Surface impoundment-$3500						
B. Landfill-$5000						
C. Land treatment-$3500						
8. Site location map on 7.5' USGS map	(265)(z)(18)(ii)					

GENERAL REQUIREMENTS - POST CLOSURE

For: Landfills
Surface Impoundments
Land Treatment
Waste Piles

Facility Name ____________
ID Number ____________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
9. 7.5' topographic map showing within ¼ mile of the property boundaries:	(z)(20)(i)(A)(B)					
A. On-site and off-site borrow areas	(z)(20)(i)(A)(B)					
B. Public and private water supplies	(z)(20)(i)(A)(B)					
C. Wells, springs, streams, swamps, other bodies of water	(z)(20)(i)(A)(B)					
D. Gas and oil wells	(z)(20)(i)(A)(B)					
E. High-tension power line or pipeline right-of-way	(z)(20)(i)(A)(B)					
F. Hydrologic and geologic features	(z)(20)(i)(A)(B)					
G. Location of 100 year flood plain	(z)(20)(i)(A)(B)					
H. Previously mined areas or adversly affected or anolmalous areas	(z)(20)(i)(A)(B)					
I. Traffic flows	(z)(20)(i)(A)(B)					
10. Soils, geologic, and groundwater report, including:	(265)(z)(20)(i)(C)					
A. Description of borings and/or wells						
B. Water table contour map						
C. Detailed soil descriptions						
11. Operational Concept Report of past activities, including brief descriptions of:	(265)(z)(20)(i)(E)					
A. Hazardous waste facility and its relationship to the installation						
B. General facility description						
C. Facility operations, methods and practices						
D. Daily operational methodology						
E. Written operational plans						
F. Waste types, sources and volumes						
G. Unit processes with detailed flow diagrams						

GENERAL REQUIREMENTS - POST CLOSURE

Facility Name ______
ID Number ______

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. Reports or narratives and specifications that fully detail past:	(265)(z)(20)(ii)(B)					
A. Operations, methods and practices, and all unit processes employed at the facility						
B. Waste types, volumes, and sources						
C. Required plans that affected the facility and its operations						
D. Quality control methods, procedures, and tests used during construction						
E. Specifications including, but not limited to, all construction information not shown on the drawings						
F. Additional reports, narratives or specifications as required by the Department						
2. Certification						
A. Registered Professional Engineer seal on all reports and design drawings	(265)(z)(19)					
B. Registered Professional Engineer seal and signature on title sheet	(265)(z)(19)					
C. Certification paragraph with responsible official's signature	(265)(z)(13)(iii)					
D. Signature of Principal Executive Officer or acceptable substitute	(265)(z)(13)(i)					
3. General Arrangement Plan showing facility layout	(265)(z)(18)(i)					

DRAFT

Facility Name ______
ID Number ______

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
4. Drawings and/or specifications with details relative to:	(265)(z)(20)(ii)(A)					
A. Compaction of solid waste						
B. Application of daily cover material						
C. Elevations and grades of final cover						
D. Management of surface water						
E. Erosion control						
F. Revegetation procedures to be used						
G. Schedule of fillings						
H. Site preparations						
I. Monitoring and measuring devices						
J. Location and limits of filled areas						
K. Cross sections indicating the interface details between filled areas						
L. Limits of construction defined by grid controls						
M. Borrow areas on-site defined by grid controls						
N. Location, description, and purpose of all easements existing on-site and a definition of all title, deed, or usage restrictions relative to the site						
O. Location of gas, oil and other wells and all utilities on-site						
P. Location of public and private water supplies on-site						
Q. Location of underground and surface mines on-site						
R. Cross sections shown on the plans and referenced to the grid system for horizontal location, whenever applicable						

DRAFT

Facility Name ______________
ID Number ______________

REQUIREMENTS	SECTION	PAGE NUMBER IN APPLICATION	COMMENTS
4. Drawings and/or specifications with details relative to (Continued):			
S. Grades for drainage of the facility			
T. Cross sections of the access roads and all weather roads, identifying construction materials, slopes, grades, and distances			
V. Grades indicating the depth of soil available at the site for future maintenance needs			
W. Process and instrumentation diagrams for unit processes employed at the facility			
X. Ground-water contour map			
Y. Other			
5. Map and drawing requirements	(265)(z)(18)(ii)		
A. Maps are 30" x 36" or smaller, clear and legible			
B. Plans are 1" F 200', with 10' contour intervals			
C. Sections and elevations have a horizontal scale 1" F 200' and vertical scale 1" F 10'			
D. Design drawings have a grid/coordinate control system, grid F 200 square feet sections			
E. Grid is tied to a permanent fixed marker on-site			
F. Vertical control tied to a benchmark elevation			

Facility Name ________________
ID Number ________________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. Ground-water monitoring system capable of detecting the entry of any hazardous waste, hazardous constituents or decomposition by products	264(n)(1,2)					
2. Copy of ground water quality assessment outline capable of determining:	264(n)(3)(i-iii)					
A. Which hazardous constituents entered g.w.,						
B. Rate and extent of migration						
C. Concentrations of constitutents						
3. Description of the monitoring system consisting of:	264(n)(4)(i-iv) or 264(n)(5)					
A. At least one upgradient well						
B. At least three down gradient wells						
C. Locations and ID of each well shown on map (none greater than 200 feet from edge of waste management area)						
4. Description of how each waste management component is monitored	264(n)(6)					
5. Description of required well casing:	264(n)(7),(8)					
A. Screened and gravel or sand packed						
B. Annular space sampling depth sealed						
C. Outer protective casing present as required						
D. Cap with lock present						

DRAFT

Facility Name ____________
ID Number ____________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
6. Copy of ground water sampling and analysis plan outlining procedures and techniques for:	264(n)(9)(10)					
A. Sample collection						
B. Sample preservation						
C. Analytical procedures						
D. Chain-of-custody						
7. Minimum list of test parameters to include at least, P4, TOC, SpC, and TOH	264(n)(11)					
8. For existing facilities, copy of background concentrations for upgradient well sites	264(n)(12)(i-iii) 264(n)(13)(i-ii) and 265(n)(10)					
9. For new facilities, a description of how background concentrations will be collected	264(n)(12)(i-iii) 264(n)(13)(i-ii) and 264(n)(14)					
10. A description of the statistical procedure to be followed in evaluating the ground-water data	264(n)(17)-(19)					

DRAFT

WASTE CHARACTERISTICS - POST CLOSURE

Facility Name ____________
ID Number ____________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. For each hazardous waste disposed:	(264)(c)(1)					
A. A general description of the waste						
B. EPA Hazardous waste number						
C. Hazard characteristics						
D. Basis for hazard designation						
E. Laboratory report detailing the chemical and physical analyses of representative samples						
OR a complete Module 1 for each hazardous waste						
2. A copy of the Waste Analysis Plan	(264)(c)(3)					
3. Liner compatability test results (if applicable) for each hazardous waste	(264)(c)(4)					

DRAFT

IGNITABLE, REACTIVE OR INCOMPATIBLE WASTES - FOR: ALL FACILITIES

Facility Name ____________
ID Number ____________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. Description of precautions taken to prevent accidental ignition or reaction of wastes, including:	(264)(g)					
A. Provisions to protect waste from sources of ignition or reaction	(264)(g)(1)					
B. Special handling procedures used for disposing	(264)(g)(2)					
C. Other specific process requirements	(264)(g)(2)					
i. Landfills	(264)(c)(4)(ii,iii)					
ii. Surface Impoundments	(264)(v)(4)(i,ii,iv,v)					
iii. Land Treatment	(264)(u)(3,21)					

DRAFT

SECURITY - POST CLOSURE

Facility Name ____________
ID Number ____________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. Description of security procedures and equipment	(264)(d)(2)					
A. 24-hour surveillance system or						
B. Artificial or approved natural barrier						
C. Warning signs						
2. In lieu of the above, demonstration that intrusion would not cause injury or violation of RCRA	(264)(d)(1)					

INSPECTION - POST-CLOSURE

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. General inspection schedule for security devices and monitoring, safety, emergency, and structural equipment						
A. Identification of types of problems to be inspected						
B. Frequency of inspections						
2. Specific process inspection requirements for:						
A. Containers	(264)(q)(5)					
B. Tanks	(264)(r)(8)					
C. Waste Piles	(264)(t)(12)					
D. Incinerators	(264)(w)(9)(v)					
E. Surface Impoundments	(264)(s)(4)(iii,vi)					
F. Loading and unloading areas	(264)(e)(3)					
3. Description of remedial action procedures	(264)(e)(4)					
4. Copy of the inspection log	(264)(e)(5)					
5. Construction schedule and description of quality control procedures, tests and inspections	(264)(e)(6)					

DRAFT

PERSONNEL TRAINING - POST CLOSURE

Facility Name ____________
ID Number ____________

REQUIREMENTS	SECTION	PAGE NUMBER IN APPLICATION	COMMENTS
1. Description of introductory and continuing training programs	(264)(f)(4, 5, 6)		
2. An outline of the training program which briefly describes:			
A. Job titles and duties of each employee position requiring training	(264)(f)(6)		
B. Content, frequency, and technique used in both introductory and continuing training for each employee			
C. Training directors qualifications	(264)(f)(2)		
D. Relevance of training to job position	(264)(f)(2)		
E. Training for hazardous waste management			
F. Training for contingency plan implementation	(264)(f)(2)		
G. Training for emergency response, including:	(264)(f)(3)		
i. Procedures for using, inspecting, repairing and replacing facility monitoring and emergency equipment			
ii. Key parameters for automatic cutoff systems			
iii. Communications or alarm systems			
iv. Response to fires or explosions			
v. Response to ground water contamination incidents			
vi. Shutdown of operations			
3. Provisions for implementing the training program			
4. Sample personnel training record form	(264)(f)(7)		

DRAFT

PREPAREDNESS, PREVENTION AND CONTINGENCY PLAN (PPC) - POST CLOSURE

Facility Name ________
ID Number ________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. A copy of the PPC plan addressing the following:	(264)(i) and "Guidelines for Development and Implementation of PPC Plans"					
A. Organizational structure for implementation of the PPC Plan						
B. Material and waste inventory						
C. Material compatibility						
D. Inspection and monitoring program						
E. Preventive maintenance						
F. Housekeeping program						
G. Security						
H. External factors						
I. Internal and external communications						
J. Employee training program						
K. List of emergency coordinators						
L. Duties and responsibilities of the emergency coordinator						
M. Chain of command						
N. List of agencies to be notified						
O. Emergency equipment						
P. Evacuation plan for installation personnel						
Q. Arrangements with emergency response contractors						
R. Agreements with state and local emergency response teams and hospitals						
S. Pollution incident history						
T. Implementation schedule						
U. Amendments as required by process						

DRAFT

Facility Name ______________
ID Number ______________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. A copy of the closure plan, including:	(264)(o)(3)					
A. If applicable, a description of partial closure including partial closure activities	(264)(o)(3)(i)					
B. A description of final closure activities and how these will be conducted according to the regulations	(264)(o)(3)(i)					
C. A description of how closure minimizes the need for post-closure maintenance and minimizes the relase of wastes	(264)(o)(2)					
D. An estimate of the schedule for final closure, including the expected year of closure and the total time required for closure activities	(264)(o)(3)(iv)					
E. Any specific closure procedures as required by subsection	(264)(o)(3)(i)					
i. Landfills	(264)(v)(3)(xxvi)					
ii. Surface impoundments	(264)(s)(3)(xxx,xxxi)					
iii. Land treatment	(264)(u)(17,18,19,20)					

DRAFT

POSTCLOSURE - POST CLOSURE

Facility Name ____________
ID Number ____________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. A copy of the postclosure plan identifying activities to be conducted after closure and their frequency, including:	(264)(o)(16)					
A. Groundwater monitoring and reporting program	(264)(o)(16)(i)					
B. Planned maintenance activities	(264)(o)(16)(ii)					
C. Name, address and phone number of person or office for contact after closure	(264)(o)(16)(iii)					

DRAFT

FINANCIAL ASSURANCE - POST-CLOSURE

Facility Name ____________
ID Number ____________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. Closure and postclosure for all disposal facilities	(264)(p)					
2. Liability insurance	(264)(p)					

SURFACE IMPOUNDMENTS AND USED FOR DISPOSAL - POST CLOSURE

Facility Name ____________

ID Number ____________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. Design drawings, specifications and referenced standards pertaining to the surface impoundment, including:	(264)(s)(3)					
A. Dimensions, capacity						
B. Surface grades	(264)(s)(3)(vii)					
C. Dikes, berms	(264)(s)(3)(ii, xvi, xviii, xix)					
D. Materials of construction						
E. Static and dynamic loadings	(264)(s)(3)(xiii)					
F. Construction procedures						
G. Perimeter markings	(264)(s)(3)(xxiii)					
H. Wind control	(264)(s)(4)(xiii)					
I. Piping, feed shutoff	(264)(s)(3)(xiv)					
J. Seasonal and ground water table provisions	(264)(s)(3)(xxii)					
K. Cap	(264)s)(3)(xvii)(F)					
L. Daily and intermediate cover	(264)(s)(3)(x, xi)					
M. Gas venting	(264)(s)(3)(xii)					
N. Surface water management	(264)(s)(3)(viii)and (4)(xv)					
O. Run-on water diversion	(264)(s)(3)(ix)					
P. Groundwater protection	(264)(s)(3)(xv)					
2. Liner system design drawings and specifications including, (if applicable):	(264)(s)(3)(xvii)					
A. Subbase design						
B. Primary liner						
C. Secondary (bottom) liner						
D. Slopes						
E. Leachate detection zone system						
F. Protective cover zone						
G. Material and installation information	(264)(s)(3)(xx, xxi)					

Facility Name ____________
ID Number ____________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
3. Leachate collection and storage system details, including (if applicable):	(264)(s)(3)(xxiv)					
A. Storage capacity						
B. Storage						
C. Piping system						
D. Containment system (sump)						
4. Leachate/Run-off treatment system design	(264)(s)(3)(xxix)					
5. Inspection procedures for assessing surface impoundment and components condition	(264)(s)(4)(iii)					
6. Inspection schedule						
7. SIER (Surface Impoundment Evaluation and Repair) Plan (if applicable)	(264)(s)(4)(x)					
8. Any special procedures used for handling and disposing potentially incompatible wastes	(264)(s)(4)(i,ii,v)					
9. Any special procedures used for disposing and handling ignitable or reactive wastes	(264)(s)(4)(iv)					
10. Provision of 50' buffer zone between hazardous waste facility and property line	(264)(s)(3)(vi)					
11. Vector, Odor, and Noise Control (VONC) Plan	(264)(s)(4)(xiv)					
12. Access road dimensions and construction description	(264)(s)(3)(iii)					
13. Special closure and postclosure requirements	(264)(s)(3)(xxx,xxxi)					

DRAFT

Facility Name ____________
ID Number ____________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. Design drawings, specifications and referenced standards pertaining to the landfill, including:	(264)(v)(3)					
A. Final surface grades	(264)(v)(3)(v,vi)					
B. Surface and run-off water management	(264)(v)(3)(vii,viii) and (4)(xviii)					
C. Run-on water diversion	(264)(v)(3)(ix)					
D. Daily and intermediate cover	(264)(v)(3)(x,xi)					
E. Gas venting	(264)(v)(3)(xii)					
F. Anticipated static and dynamic loadings	(264)(v)(3)(xiii)					
G. Liner system description, including (if applicable):	(264)(v)(3)(xiv)					
i. Subbase	(264)(v)(3)(xiv)(A)					
ii. Liner materials, permeability, compatibility						
iii. Bottom liner	(264)(v)(3)(xiv)(B)					
iv. Leachate detection zone system	(264)(v)(3)(xiv)(C)(xix)					
v. Top (primary) liner	(264)(v)(3)(xiv)(D)					
vi. Protective cover zone/leachate collection zone	(264)(v)(3)(xiv)(E)					
H. Cap	(264)(v)(3)(xiv)(F)					
I. Seasonal and ground water table provisions	(264)(v)(3)(xv)					
J. Perimeter markings	(264)(v)(3)(xvi)					
K. Protection from existing landfill area leachate (if applicable)	(264)(v)(3)(xvii)					
L. Leachate collection and storage system (if applicable)	(264)(v)(3)(xviii)					
M. Leachate and/or runoff treatment system	(264)(v)(3)(xviii, xxiv, xxv)					
N. Groundwater protection	(264)(v)(4)(viii)					

Facility Name ____________
ID Number ____________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
2. Description of any special operating standards used	(264)(v)(4)					
A. Wind dispersal protection	(264)(v)(4)(i,xvi)					
B. Incompatible waste provisions						
C. Separation from municipal and liquid wastes						
D. Layering						
E. Inspection	(264)(v)(4)(xix)					
3. Provision of 50' buffer zone between hazardous waste facility and property line. No buildings or structures within 25' of disposal area	(264)(v)(3)(iv)					
4. Vector, Odor, and Noise Control (VONC) Plan	(264)(v)(4)(vii)					
5. Access road dimensions and construction description	(264)(v)(3)(i)					
6. Special closure requirements	(264)(v)(3)(xxvi)					

DRAFT

LAND TREATMENT - POST CLOSURE

Facility Name ______________
ID Number ______________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
1. A copy of plan that specifies:	264(n)(3)(i-iv)					
A. The waste that were treated at the facility						
B. Design measure and operating practices used						
C. Run-on and run-off control measures						
D. Unsaturated zone monitoring program						
E. Ground-water monitoring program						
2. Specify wastes constituents that were treated	264(n)(4)					
3. Specify the vertical and horizontal dimensions of the treatment zone used	264(n)(5)					
4. A copy of a report demonstrating treatment of waste constituents including any:						
A. Field test results						
B. Laboratory tests						
C. Operating data						
D. Operating requirements						
E. Design requirements						
F. Map of area used						
G. Application rates and number of applications						
H. How long site was operated						
I. Monitoring procedures						
J. Treatment zone dimensions						
K. Soil descriptions						
L. Closure procedures used						
5. Describe method of pH control	264(u)(9)(i)					

DRAFT

Facility Name ____________
ID Number ____________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
6. Describe method of application and application rates used	264(u)(9)(ii)					
7. Describe methods to enhance microbial or chemical reactions used	264(u)(9)(iii)					
8. Describe method used to control moisture content in soils	264(u)(9)(iv)					
9. Describe method used to incorporate waste into soil	264(u)(9)(v)					
10. Describe on-site soils according to USDA-SCS classification system	264(u)(9)(ix-xiii)					
11. Submit map locating:						
A. Streams						
B. Public and private water supplies						
C. Bedrock outcrops						
D. Property lines						
E. Sink holes or closed depressions						
12. Run-on and run-off control system design plans (25-year storm)	264(u)(10,13)					
13. If good chain crops were grown a copy of a report describing:	264(u)(18)(i-iv) and 264(u)(19)(i-iv)					
A. If waste constituents were transferred to the food or feed portions of the crop						
B. Results of field tests						
C. Results of greenhouse studies						
D. Results of other available data						
E. Results from operating data						

DRAFT

Facility Name ______________
ID Number ______________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
13. If good chain crops were grown a copy of a report describing: (Continued)						
F. Soil characteristics						
G. Waste characteristics						
H. Results of laboratory tests						
I. Application rates and methods used						
J. Crop management practices used						
K. Operating procedures						
14. Description of crop management practices used	264(u)(20)					
15. A copy of unsaturated zone monitoring plan that details:	264(u)(21)					
A. Constituents being monitored						
B. Soil core monitoring						
C. Background values for soils and soil pore liquid						
D. Frequency and times for sampling for soil and soil pore liquids						
E. Statistical procedure for comparing monitoring						
F. Sample collection procedures						
G. Analytical procedures						
16. A copy of closure plan used that details:	264(u)(24)					
A. Operational procedures used during closure						
B. Run-on controls used						
C. Run-off controls used						
D. Wind dispersol controls used						
E. Food-chain crop restriction necessary						
F. Unsaturated zone monitoring used						
G. Revegetation procedures used						

DRAFT

Facility Name ____________
ID Number ____________

REQUIREMENTS	SECTION				PAGE NUMBER IN APPLICATION	COMMENTS
17. A copy of post-closure plan that details during post-closure						
A. Operational procedures necessary						
B. Maintenance of vegetative cover						
C. Run-on control measures						
D. Run-off control measures						
E. Wind dispersal measures						
F. Food-chain crop restrictions						
G. Unsaturated zone monitoring measure						
H. Ground-water monitoring						

DRAFT

QUALITY ASSURANCE PROGRAM PLAN

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

BUREAU OF SOLID WASTE MANAGEMENT

1.0: QUALITY ASSURANCE PROGRAM PLAN IDENTIFICATION FORM

Document Title: Quality Assurance Program Plan, Bureau of Solid Waste Management

Document Control No.: BSWM-QA001

Organization Title: Pennsylvania Department of Environmental Resources, Bureau of Solid Waste Management

Address: P. O. Box 2063, Harrisburg, Pennsylvania 17120

Responsible Official: Donald A. Lazarchik, Director, Bureau of Solid Waste Management

Telephone: (717) 787-9870

James P. Snyder, Assistant Director, Bureau of Solid Waste Management

(717) 787-9871

Quality Assurance Officer: David M. Friedman

Telephone: (717) 787-7381

Plan Coverage: This Quality Assurance Program Plan for the hazardous waste portion of the Pennsylvania Solid Waste Management Program covers the elements of quality assurance planning and includes study planning, sample collection, handling and analysis; data validation; and management processes. The Plan, therefore, describes the total integrated program for assuring the reliability of these processes in producing environmental data.

Concurrences:

(1) Name: David M. Friedman
Title: Quality Assurance Officer
Bureau of Solid Waste Management

Signature David M. Friedman Date 6-26-85

(2) Name: Paul Baker
Title: Quality Assurance Officer
Bureau of Laboratories

Signature Paul E. Baker Date 6.26.85

Approval for Agency:

(1) Name: Donald A. Lazarchik
Title: Director
Bureau of Solid Waste Management

Signature Donald A Lazarchik Date 6/26/85

(2) Name: James P. Snyder
Title: Assistant Director
Bureau of Solid Waste Management

Signature ______________________ Date 6/28/85

Approval for Implementation:

(1) Name: R. Harry Bittle
Title: Deputy Secretary for Environmental Protection

Signature ______________________ Date 7/3/85

Approval by U.S. Environmental Protection Agency, Region III;

(1) Name: Charles Jones, Jr.
Title: Regional Quality Assurance Officer

Signature ______________________ Date ____________

(2) Name: Greene A. Jones
Title: Director, Environmental Services Division

Signature ______________________ Date ____________

TABLE OF CONTENTS

2.0: INTRODUCTION

The Environmental Protection Agency (EPA) is requiring all EPA-supported monitoring programs to develop and implement quality assurance plans.

The Pennsylvania Department of Environmental Resources (DER), Bureau of Solid Waste Management (BSWM) is receiving a grant from EPA for assumption and implementation of the RCRA program within the Commonwealth. The Bureau has been directed, as a condition of its FY-84 RCRA grant, to develop and submit to EPA a quality assurance program plan.

This document is the Commonwealth's quality assurance plan for its solid and hazardous waste monitoring activities.

3.0: QUALITY ASSURANCE POLICY

The goal of a quality assurance program within the Commonwealth of Pennsylvania is to insure that all environmental data obtained will be scientifically valid, defensible and of known and acceptable precission and accuracy. This goal can be achieved by insuring that adequate quality assurance procedures are used throughout the entire monitoring process, and that adequate resources are provided to support the quality assurance program.

All environmental data generated will be of known and acceptable quality. This quality, and associated level of effort of required quality assurance activities, will be sufficient to meet the needs of a solid and hazardous waste program.

The quality assurance procedures for each routine activity are described in the BSWM's approved quality assurance project plan. Specific quality assurance project plans will be prepared or modified, as needed, for specific projects.

All extramural monitoring activities which produce environmental data for RCRA (hazardous waste) purposes will be conducted using acceptable quality assurance procedures.

4.0: QUALITY ASSURANCE MANAGEMENT

4.1 Introduction: The Bureau quality assurance officers have overall responsibility for the implementation of the quality assurance requirements contained in the quality assurance project plans. The Bureau quality assurance officers are delegated the authority and responsibility for implementation of quality assurance activities in each of the program responsibilities.

4.2 Responsibilities: Environmental monitoring activities in the regional offices are the responsibility of the BSWM Operations Section. The supervisors of these regional Operations Sections have been designated the Bureau's sampling quality control officers. In this capacity they function to insure that proper quality control procedures are followed in field sampling activities by performing the required on-site audits of field activities.

The Bureau's quality assurance officer is responsible for an audit of the entire data production process. Periodic reports from the Regional Operations supervisors' on-site audits will be compiled and audited to assure that quality assurance procedures are being followed. Coordination with the Bureau of Laboratories is achieved in the following way. The Bureau quality assurance officer will evaluate the results of the field generated performance audits. Results which are unacceptable to the Bureau will be discussed with the lab quality assurance officer. A joint review of laboratory QC procedures and/or field sampling procedures will be made, and appropriate corrective action taken. The Bureau of Laboratories is subject to a laboratory systems audit which is performed annually. A copy of this system audit will be reviewed by the Bureau quality assurance officer and included in the Bureau's annual quality assurance program status report.

As part of his duties and responsibilities, the Bureau quality assurance officer will:

- Review and approve quality assurance project plans.
- Work with program managers to insure proper corrective action is taken when needed.
- Provide technical quality assurance guidance and assistance to the regional offices, as needed.
- Submit yearly reports to management on quality assurance activities and problems.

4.3 Communications: Lines of communication for quality assurance program activities are shown in figure 1. The quality assurance officers will keep management informed at all times of the performance of the data production system and of any program problems and needs. Management will respond to identified program problems and needs to insure an acceptable level of quality assurance.

A yearly report will be issued by the Bureau's quality assurance officer which discusses the performance and system audits performed during the past year, and any significant quality assurance problems identified during that time, and recommendations for corrective action procedures.

4.4 Quality Assurance Program Assessment: An ongoing program of quality control checks will provide a means of assessing the performance of this plan. This will be accomplished by the following:

System Audit - The operations supervisor in each region shall accompany each sample collector in his region into the field on a regular basis. In the course of this day, the supervisor will observe the sampling techniques employed by the sample collector. Sampling techniques which are inconsistent with the methods outlined in the BWSM's Field Sampling Procedure Manual will be brought to the attention of the sample collector for correction. Joint follow-up inspections will be scheduled by the operations supervisor as needed.

Performance Audit - One sample in twenty-five will be a split sample. The solid waste specialist shall submit one of the splits under the correct facility name with an explanation of conditions and descriptions of sampling, as usual. The second split shall have identical conditions and description of sampling, but shall use a fictitious facility name and location. The sample collector shall properly identify each split in the field log. Sample results shall be compared when received and copies forwarded to the Bureau's QA Officer.

The Bureau of Laboratories, as well as the BSWM, will allow their internal and extramural RCRA monitoring programs to be subjected to external performance reviews or audits.

5.0 PERSONNEL QUALIFICATIONS

All Quality Assurance personnel must have adequate technical and quality assurance education, training and experience to meet their designated responsibilities.

All other monitoring personnel shall possess adequate experience and knowledge to perform satisfactorily all technical tasks assigned.

Training shall be available to BSWM employees as stated in Section 2.6 of the Bureau's Field Sampling Manual on an as-needed basis.

6.0 FACILITIES, EQUIPMENT AND SERVICES

Facilities, equipment and services used in environmental monitoring activities shall be of acceptable quality. Laboratory facilities shall be of adequate size with satisfactory lighting, ventilation, temperature, noise levels and humidity. Satisfactory safety and health maintenance features shall be present.

Acceptable utility services such as electricity, water and air shall be present in the laboratory.

General laboratory equipment shall be present in sufficient quantity and shall be inspected and maintained in good condition so as to provide for the generation and processing of environmental data having the quality and integrity established by the quality assurance project plan. This includes such items as air conditioners, ovens, furnaces, generators, refrigerators, incubators, laboratory hoods, sinks, counters and analytical instrumentation.

General field equipment shall be present in sufficient quantity and in acceptable condition as to provide for the generation and processing of environmental data. All such equipment shall be inspected and maintained as specified in the BSWM's Field Sampling Procedure Manual. This includes such equipment as thermometers, sampling apparatus, pH meters and flow meters.

Personnel shall be provided with adequate protective equipment and training as to insure their health and safety. This applies to any contractors receiving State/EPA funds for RCRA monitoring.

7.0: DATA GENERATION

Environmentally-related monitoring activities include all field and laboratory investigations which generate data and the data processing activities which include data storage, retrieval and analysis. A BSWM Field Sampling Procedure Manual has been developed and revised as of September 4, 1984. The manual contains specific standard operating procedures which must be followed for all environmental monitoring activities so that the data generated will be scientifically valid, defensible, of known accuracy and precision, and of acceptable completeness, representativeness and comparability. The quality assurance procedures for each routine BSWM activity are described in the BSWM's approved quality assurance project plan. Specific quality assurance project plans will be prepared or modified, as needed, for each specific monitoring project.

8.0: DATA PROCESSING

Data processing includes collection, validation, storage, transfers and reduction, and must be done in such a way as to prevent errors and loss of information.

A. Collection: The BSWM's Field Sampling Procedure Manual has been completed and describes the specific procedures to be followed in collecting environmental monitoring data. These procedures are part of the BSWM's quality assurance project plan.

B. Validation: Data validation is the process whereby data is accepted or rejected based on a set of criteria, and is established in the quality assurance project plan. Data validation is checked by the Bureau of Laboratories through the interpretation of the results of EPA and USGS performance evaluation audits, duplicate sample analysis, spike recoveries, instrument calibration, detection limits, tests for outliers and data entry checks. These data validation checks are described in the Bureau of Laboratories' Quality Assurance Handbook. The BSWM quality assurance officer also checks data validation by reviewing the results of split sample analyses.

C. Storage: At every stage of data processing at which a permanent collection of data is stored, procedures are established in the quality assurance project plan to ensure data integrity and security. Raw data for survey samples and quality control samples is kept as chart recordings, printer tapes or computer disc/tapes for a minimum of three years. All relevant data from BSWM field sampling activities is recorded in a field notebook. Such information includes sample number, time and date, location, appearance, results of field measurements and preservation of the sample. Notebooks are maintained by the sample collectors and checked by the section supervisor.

D. Transfers: Quality assurance project plans will describe procedures to ensure that data transfers are as error-free as possible, and that no information is lost in the transfer. Data entered into the computer is checked by the laboratory for data entry errors by 100% data entry validation checks. The Bureau of Laboratories' Quality Assurance Handbook describes the procedures used in minimizing transfer errors.

E. Reduction: Data reduction includes all processes which change either the form or expression or quantity of data items. Procedures for validation, verification and statistical analysis of data reduction processes are described in the Bureau of Laboratories' Quality Assurance Handbook.

9.0: DATA QUALITY ASSESSMENT

The quality of data generated for environmental monitoring in the BSWM is assessed in the following manner:

A. Accuracy is determined by the analysis of a standard solution at a frequency of one out of every ten samples. Results of the standards are entered into a computer program and a percent recovery is calculated, giving an accuracy statement. Where individual projects provide spiked samples, a percent recovery is calculated. In addition, a third-party check sample is analyzed periodically.

B. Precision is determined by the analysis of a duplicate sample at a frequency of one out of every ten samples. The results of duplicates are entered into a computer program, and a percent difference from the mean is calculated, giving a precision statement. Also, where individual projects provide field duplicates, manual calculations of these duplicates are performed by field personnel.

C. Completeness is assessed by determining the amount of data needed by particular use, such as a planning or enforcement action. The quantity of data needed will be addressed in specific quality assurance project plans.

D. Representativeness is assessed by determining how well the data generated represents the actual conditions at the sampling location. The conditions under which each sample is collected are described in a sample field log, as well as a description of the sampling site. Procedures for insuring representativeness will be contained in specific quality assurance project plans.

E. Comparability is determined by comparing a group of data for consistency of reporting units, data format and method of sampling and analysis. Such comparability is addressed in the Bureau of Laboratories' Quality Assurance Handbook, and will be addressed in specific quality assurance project plans.

10.0 CORRECTIVE ACTION

As described in Section 4 of the quality assurance program plan, the QC sampling officers are responsible for assuring proper quality assurance activities in field sampling. The Bureau quality assurance officers are responsible for assuring all aspects of quality assurance activities within their Bureau's program, including both identifying quality assurance program problems and needs.

Corrective action procedures are specified in the BSWM's approved quality assurance project plan and in Section 4.1 of the Bureau of Laboratories' Quality Assurance Handbook.

It is important that the quality assurance officers take appropriate corrective action when necessary to resolve any identified problems. Management will be kept adequately informed through reports issued yearly, or whenever deemed necessary by the BSWM's and/or Bureau of Laboratories' quality assurance officer(s).

11.0: IMPLEMENTATION REQUIREMENTS AND SCHEDULE

In order to implement the quality assurance program plan, the following implementation schedule is included:

1.	Update Field Sampling SOP Manual.	As Needed
2.	Review and update quality assurance project plans.	Yearly
3.	Implement quality assurance system and performance audits.	Ongoing
4.	Prepare and submit quality assurance program status report.	6/1/each year
5.	Develop specific quality assurance project plans.	As Needed
6.	Review and update quality assurance program plan.	Yearly

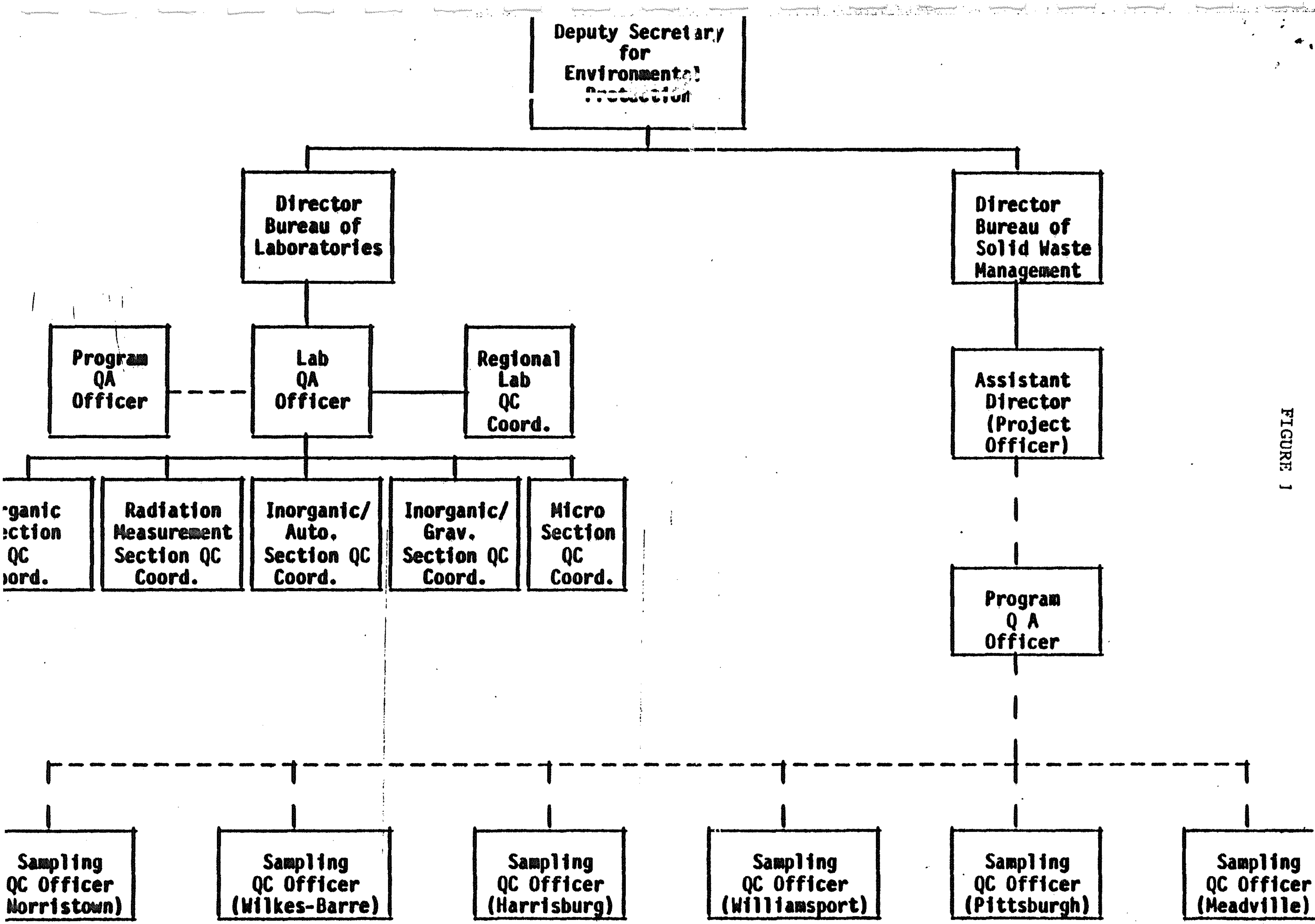


FIGURE 1

anization Structure for Quality Assurance Activities Only

QUALITY ASSURANCE PROJECT PLAN

Pennsylvania Department of Environmental Resources

Bureau of Solid Waste Management

APPROVALS

Donald A Lazarchik — 6/6/84

Donald A. Lazarchik — Date
Director, Bureau of Solid Waste Management

James P. Snyder — 6/6/84

James P. Snyder — Date
Assistant Director, Bureau of Solid Waste Management - Project Officer

David M. Fried — 6/8/84

David M. Friedman — Date
QA Officer

TABLE OF CONTENTS

Introduction

The Environmental Protection Agency has directed states receiving financial assistance under the RCRA Subtitle C Hazardous Waste Program to submit a written Quality Assurance (QA) project plan to EPA as a condition of their grant agreement.

The Bureau of Solid Waste Management has prepared this QA project plan in order to define the policies, objectives and activities it will follow in achieving its goal of producing the best possible data under its solid waste program responsibilities. The Bureau is hereby committed to implementation of this QA project plan in all its environmental monitoring activities.

Project Description

The goal of the Pennsylvania Solid Waste Management Program is to insure that waste materials are properly handled, stored, transported, treated and disposed of.

In support of this overall goal, environmental data generated from samples collected or tested in the fulfillment of the projects identified below must be of known and acceptable quality. This will allow the Bureau to reliably assess the present condition and to aid in the determination of the effectiveness of corrective measures. Decisions which are made on the need for abatement activities and on the achievement of acceptable environmental quality must depend on the availability of sound and reliable data.

Each specific project identified below is done in support of this goal. These projects are:

1. permitting activities
2. routine inspections
3. investigations (non-emergency)
4. investigations (emergency)

Data usage will vary for each project. The specific uses are:

permitting activities - Samples may be collected to verify conditions reported in the permit application gor generating, treatment, storage or disposal facility.

routine inspections - Samples are collected during routine inspections of permitted generating, treatment, storage or disposal facilities to insure that the waste, groundwater, soil, surface waters or air meets established standards. These samples will verify self-monitoring data provided by the permitted facility, compliance with the applicable state permit, or be used in possible enforcement activities.

investigations (non-emergency) - Samples are collected during investigations of non-permitted facilities to determine if a violation of the Pennsylvania Solid Waste Management or the Department's Rules and Regulations has occurred, or to access the possibility or extent of environmental pollution.

investigations (emergency) - Samples are collected when an emergency condition such as a spill of hazardous waste material occurs. These samples wil help in the design of remedial measures to prevent or to reduce environmental damage.

The design of the monitoring system and for various permitted facilities is specified in the Department's Hazarous Waste Regulations.

Collection of samples from the other projects (and occasionally from the permitted activity project) is site-specific and will vary greatly the individual situation. Sampling plans will be designed according to the guidance in Section 3.6 of the July 8, 1983 revision of the Bureau of Solid Waste Management's field sampling SOP.

Sampling parameters will vary with the wastes involved. Analytical methods for the examination of the samples are contained in:

1. Methods for Chemical Analyses of Water and Waste EPA-600/4-79-020.

2. Standard Methods for the Examination of Water and Wastewater 15th edition.

3. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater EPA-600/4-82-057.

4. Test Methods for Evaluating Solid Waste Physical/Chemical Methods SW-846 2nd edition.

5. Pennsylvania Department of Environmental Resources, Bureau of Laboratories Methods Manual (draft 1983).

Sample containers, preservation techniques and holding times for water samples are specified in EPA's table 2, "Containers, Preservation Techniques and Holding Times", Federal Register, Volume 44, Number 244, December 18, 1979, page 75050-75052, and in Table 3.4 of the July 8, 1983 revision to the Bureau of Solid Waste Management's field sampling SOP.

Data reporting procedures are applicable to all projects and are specified in Section 3.5 of the Bureau of Laboratories, Quality Assurance Handbook.

Data validation procedures are applicable to all projects and are specified in Section 4.7 of the Bureau of Laboratories Quality Assurance Handbook.

Schedule of Tasks and Products

Sampling activities are routinely scheduled by the regional offices as part of the overall Pennsylvania Solid Waste Management program. Sampling for the routine inspection project is ongoing, and is approximately constant throughout the year. Sampling for all other projects is on an as-needed basis, with highest priority given to emergency investigations.

Project Organization and Responsibility

See the attached Quality Assurance organizational chart.

Data Quality Requirements and Assessments

Statements for method detection limits, precision and accuracy, where appropriate, are contained in the Bureau's Methods Manual.

Accuracy is determined by the use of spikes and QC reference material standards. Laboratory QC samples are analyzed at a frequency of 10 to 20% of sample load. The standard deviation for precision is based on percent difference from the mean. Standard deviation for accuracy is based on percent recovery.

A discussion on obtaining representativeness, comparability and completeness from sampling activities is contained in Section 3.6 and in Table 3.3 of the July 8, 1983 revision to the Bureau of Solid Waste Management's field sampling SOP.

Sampling Procedures

For a complete description of sampling procedures, refer to the July 8, 1983 revision to the Bureau of Solid Waste Management's field sampling SOP.

Sample Custody Procedures

For a complete description of sample custody procedures, see the chain of custody SOP, draft 1983, for the Department's Environmental Protection Deputate.

The name of the individual who acts as laboratory sample custodian cannot be furnished at this time since the position is vacant due to a recent promotion. Until the position is filled, various individuals fulfill this duty as required. When the position is filled, we will furnish the name to you.

Calibration Procedures and Preventative Maintenance

Lab - Calibration procedures and frequency of calibration are contained in the appropriate analytical method.

The Bureau of Laboratories has service and preventative maintenance contracts for its major analytical equipment. Maintenance is performed according to the specifications contained in the equipment manual.

Field - Information on calibration and maintenance of field sampling and measurement equipment is contained in Sections 2.8 and 4.1 of the July 8, 1983 revision to the Bureau of Solid Waste Management's field sampling SOP.

Field maintenance of sampling equipment is contained in Section 2.8 of the July 8, 1983 revision to the Bureau of Solid Waste Management's field sampling SOP.

Documentation, Data Reduction and Reporting

Lab - Raw data for survey samples and QC samples are kept as chart recordings, printer tapes or computer disc/tapes for a minimum of three years.

Calibration procedures are described in the appropriate analytical procedure in the referenced Methods Manual.

Data entered into the computer is checked for data entry errors by 100% data entry validation checks.

Analytical reports are handwritten by analyst or computer generated. Data is then verified by the analyst's supervisor.

Internal QC check are performed according to the procedures specified in Section 3.7 of the Bureau of Laboratories, Quality Assurance Handbook.

Sample calculations performed according to the procedures contained in Section 3.5 of the Bureau of Laboratories, Quality Assurance Handbook.

Field - All relevent data from a sample collection activity is recorded in a field notebook. Such information includes sample number, time and date, location, appearance, results of field measurements and preservation of the sample.

Also, each sample is accompanied by a sample analysis request sheet which is completed according to Section 2.3 of the July 8, 1983 revision to the Bureau of Solid Waste Management's field sampling SOP.

Internal QC check are performed according to the procedures in Section 2.7 of the July 8, 1983 revision to the Bureau of Solid Waste Management's field sampling SOP.

Data Validation

Lab - Data validation, where appropriate, involves the interpretation of the results of EPA performance evaluation audits, USGS PE audits, duplicate sample analysis, spike recoveries, instrument calibrations, detection limits, tests for outliers and data entry checks.

Data vlaidation is the responsibility of the Supervisor for each analytical section.

Field - Results of split sample analyses are reviewed by the Bureau QA officer.

Performance and System Audits

Lab - Performance evaluation (PE) samples produced by EPA are analyzed four times per year. Samples produced by USGS are analyzed two times per year. Other PE samples are analyzed on a periodic basis.

System audit is performed biannually by EPA.

Field - For a discussion of the field audit procedures, see Section 2.7 of the July 8, 1983 revision to the Bureau of Solid Waste Management's field sampling SOP.

Corrective Action

Lab - When QC samples indicate a system is out of control, measures are implemented to identify and correct the problems. The affected samples are either rerun or the appropriate qualifications are indicated in the data.

Section 4.1 of the Bureau of Laboratories, Quality Assurance Handbook describes corrective action procedures.

Field - Where review of split sample analyses by the Bureau's QA Officer reveals a problem with analytical data reported by the lab, the Bureau's QA Officer will report this finding to the lab QA officer and discuss ways in which to eliminate the problems.

Reports

A yearly report will be issued by the Bureau's QA Officer which discusses the performance and system audits performed during the past year, any significant QA problems identified during that time, and recommendations for corrective action procedures.

More frequent reports will be issued if the Bureau's QA Officer identifies significant problems which require immediate corrective action.

Project Organization and Responsibility

Director, Bureau of Laboratories	Floyd D. Kefford
QA Officer, Bureau of Laboratories	Paul E. Baker
QC Coordinator, Erie Regional Laboratory	Gary Manczka
QC Coordinator, Organic Chemistry Section	Michael DeFilippo
QC Coordinator, Radiation Measurement Section	Doris Brunner
QC Coordinator, Inorganic/Automated Section	Lynn Schaffer
QC Coordinator, Inorganic/Gravimetric Section	Linda Cohen
QC Coordinator, Microbiology Section	Frank Babicz
Director, Bureau of Solid Waste Management	Donald A. Lazarchik
Assistant Director (Project Officer)	James P. Snyder
Progam QA Officer	David M. Friedman
Sampling QC Officer (Norristown)	Bruce Beitler
Sampling QC Officer (Wilkes-Barre)	William McDonnell
Sampling QC Officer (Harrisburg)	Frank Fair
Sampling QC Officer (Williamsport0	Frank Bertovich
Sampling QC Officer (Pittsburgh)	Tony Orlando
Sampling QC Officer (Meadville)	Patrick Boyle

Distribution

Richard M. Boardman	-	Associate Deputy Secretary for Environmental Management
Donald A. Lazarchik	-	Director, Bureau of Solid Waste Management
James P. Snyder	-	Associate Director, Bureau of Solid Waste Management
Gary R. Galida	-	Chief, Division of Hazardous Waste Management
Dwight D. Worley	-	Chief, Division of Operations
Leon Gonshor	-	Regional Environmental Director (Norristown)
James Chester	-	Regional Environmental Director (Wilkes-Barre)
John Moyer	-	Regional Environmental Director (Harrisburg)
Mark Roller	-	Regional Environmental Director (Williamsport)
Terry Fabian	-	Regional Environmental Director (Pittsburgh)
Richard Zinn	-	Regional Environmental Director (Meadville)
Wayne Lynn	-	Regional Solid Waste Manager (Norristown)
Dave Lamereaux	-	Regional Solid Waste Manager (Wilkes-Barre)
Edward Simmons	-	Regional Solid Waste Manager (Harrisburg)
Richard Bittle	-	Regional Solid Waste Manager (Williamsport)
Charles Duritsa	-	Regional Solid Waste Manager (Pittsburgh)
Russell Crawford	-	Regional Solid Waste Manager (Meadville)
Bruce Beitler	-	Regional Operations Supervisor (Norristown)
William McDonnell	-	Regional Operations Supervisor (Wilkes-Barre)
Frank Fair	-	Regional Operations Supervisor (Harrisburg)
Frank Bertovich	-	Regional Operations Supervisor (Williamsport)
Tony Orlando	-	Regional Operations Supervisor (Pittsburgh)
Patrick Boyle	-	Regional Operations Supervisor (Meadville)
Paul Baker	-	QA Officer, Bureau of Laboratories
David Friedman	-	QA Officer, Bureau of Solid Waste Management

QUALITY ASSURANCE HANDBOOK

PA Department of Environmental Resources
Bureau of Laboratories
Harrisburg, Pennsylvania 17120

DRAF

DRAFT

APPROVALS:

QA Coordinator/Officer (BoL)	______	Date:	______
Laboratory Director (BoL)	______	Date:	______
Associate Deputy Secretary (EP/DER)	______	Date:	______
Deputy Secretary (EP/DER)	______	Date:	______

TABLE OF CONTENTS

DRAFT

SECTION

1

1.0 INTRODUCTION

DRAFT

1.1 Quality Assurance Handbook

1.1.1 Purpose

The purpose of the Bureau of Laboratories Quality Assurance Handbook is to provide an outline and working guide for the quality assurance program. It is intended to serve as the resource document for quality assurance and to provide detailed operational instructions for the measurement processes and evaluations that are to be used in implementing the quality assurance program.

1.1.2 Target Populations

The handbook should be particularly beneficial to technicians, chemists and supervisors responsible for actual analysis, technical oversight and coordination of analytical chemical procedures.

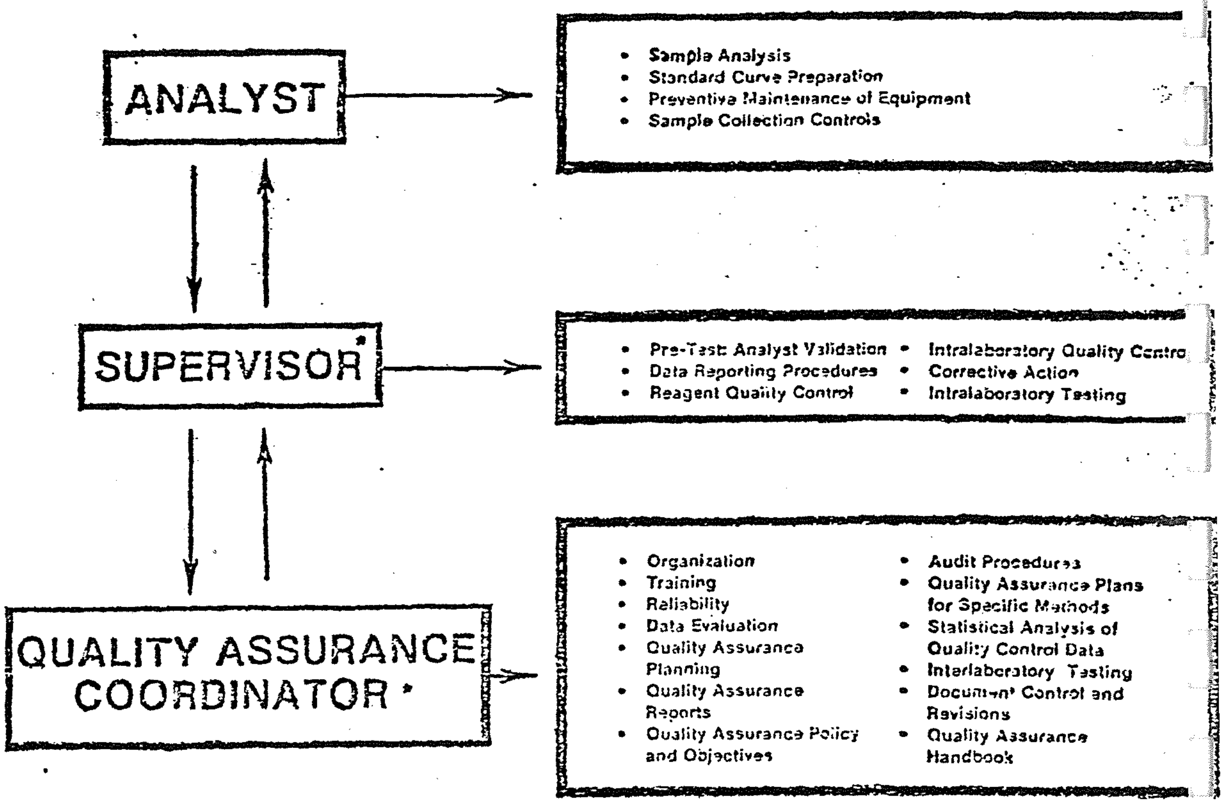
1.1.3 Content

The handbook is a compilation of quality assurance principles, practices, guidelines and procedures that are to be applied within the PA Department of Environmental Resources, Bureau of Laboratories.

1.1.4 Scope

The areas covered by the quality assurance program for this analytical chemistry measurement system are shown in Figure 1.1.

The figure illustrates the need for a quality assurance system that will address all elements and yet allow enough flexibility to emphasize those elements most applicable to a specific project.



* In concert with the Quality Assurance Office or Coordinator

Figure 1.1 Quality Assurance Program.

Arrows show shared responsibilities and communication.

1.2 Contents

This handbook includes principles and procedures for achieving quality assurance in the Bureau of Laboratories. It provides general guidelines applicable to analytical measurement systems. Specific guidelines applicable to particular measurement processes are in the methods manual.

.Section 1 Introduction

.Section 2 Outlines the organization of the quality assurance function. Shows duties and lines of authority for the task.

.Section 3 Lists the parameters that are common to good laboratory practice.

.Section 4 Illustrates the way quality assurance data are handled.

.Section 5 Has detailed instructions on how to do required calculations with quality assurance data.

1.3 Quality Assurance

The total program for assuring the reliability of monitoring data. QA Activities would include laboratory inspections, independent performance audits, interlaboratory comparisons and periodic evaluation of internal quality control data.

1.4 Quality Control

The routine application of procedures for controlling the measurement process. QC Activities would include routine checks included in normal internal procedures, e.g., periodic calibrations, duplicate checks, split samples and spiked samples.

1.5 Document Control and Revisions

A quality assurance program is the documentation that shows that good laboratory practices are being followed. This documentation begins with a

Quality Assurance Handbook. The control system used for this handbook is described below.

1.5.1 Indexing Format

1.5.2 Revisions

1.5.3 Distribution Record

1.5.4 Responsibility for Changes

Changes may be made by the issuance of an entirely new document, replacement pages, an errata sheet, or by pen and ink posting on the original document. Upon receipt of any of these changes, you should remove and destroy all revised pages, sections, etc., and/or make pen and ink corrections as noted with the date of the correction and the initials of the individual making the change.

SECTION

2

DRAFT

2.0 QUALITY ASSURANCE ORGANIZATIONAL ASPECTS

2.1 Statement of Policy

The Bureau of Laboratories, Department of Environmental Resources, is committed to the production of quality data to meet the needs of user groups. Proper quality control simplifies decision making, prevents wasted effort and minimizes the possibility of error.

2.1.1 Specific Policies

2.1.1.1 Publication, distribution and maintenance of current and complete Laboratory Analytical Methods and Procedures, Calibration Data Sheets and Analytical Instrument Operating Instructions.

2.1.1.2 Periodic calibration of instruments in the laboratory, quality control checks on analytical instruments to ensure proper function at all times and a preventive maintenance program.

2.1.1.3 Assurance of appropriate and fresh reagents, standards and chemicals, and of appropriate, calibrated glassware.

2.1.1.4 Establishment and maintenance of total analytical quality control systems to assure continued precision and accuracy of laboratory reports.

2.1.1.5 Requirements for participation in inter-laboratory quality evaluation programs.

2.1.1.6 Requirements for training and qualifying personnel prior to running new tests and in quality control techniques. This qualification test is to be statistically valid and include evaluation of precision and accuracy. The qualification standard shall be the established level of analytical quality of the laboratory.

DRAFT

2.2 Statement of Objectives

Quality assurance objectives must be defined, documented and issued to all personnel who can affect the quality of data. The objective of the Bureau of Laboratories Quality Assurance Program is to assure scientific reliability of analytical data (precise, accurate, representative and reproducible among laboratories). Management, administrative, statistical, investigative, preventive and corrective techniques will be employed to maximize reliability of the date.

2.2.1 Written objectives are needed because they:

2.2.1.1 Unify the thinking of those concerned with quality control and quality assurance.

2.2.1.2 Stimulate effective action.

2.2.1.3 Are necessary prequisites to an integrated, planned course of action.

2.2.1.4 Permit comparison of completed performance against stated objectives.

2.2.1.5 Establish standards of performance.

2.2.2 Specific Objectives

2.2.2.1 To develop and/or put into service methods capable of meeting the users' needs for precision, accuracy, sensitivity and specificity.

2.2.2.2 To establish the level of quality of the laboratory's routine performance.

2.2.2.3 To make any changes in the routine methodology found necessary to make it compatible with performance needs and remain consistent with users' needs.

2.2.2.4 To monitor the routine operational performance of the laboratory through an appropriate intra-laboratory program and to provide for corrective actions as necessary.

2.2.2.5 To participate in quality evaluation programs with peer laboratories and/or governmental agencies to achieve and maintain consistent uniform levels of quality.

2.2.2.6 To document and thereby formalize the control procedures required, including the data evaluation technique.

2.3 Organization

The organization chart is shown in Figure 2.1. The quality assurance organizational chart displays line and staff relationships and lines of authority and responsibility.

2.4 Quality Assurance Coordinator/Officer

The Quality Assurance coordinator/officer is responsible for the conduct of the laboratory quality assurance program and for taking or recommending measures to ensure the fulfillment of the quality objectives of management and the carrying out of quality assurance policies in the most efficient and economical manner commensurate with ensuring continuing accuracy and precision of data produced.

2.4.1 Responsibilities and Authority

2.4.1.1 Develops and carries out quality control programs, including statistical procedures and techniques, which will help meet quality control standards at minimum cost.

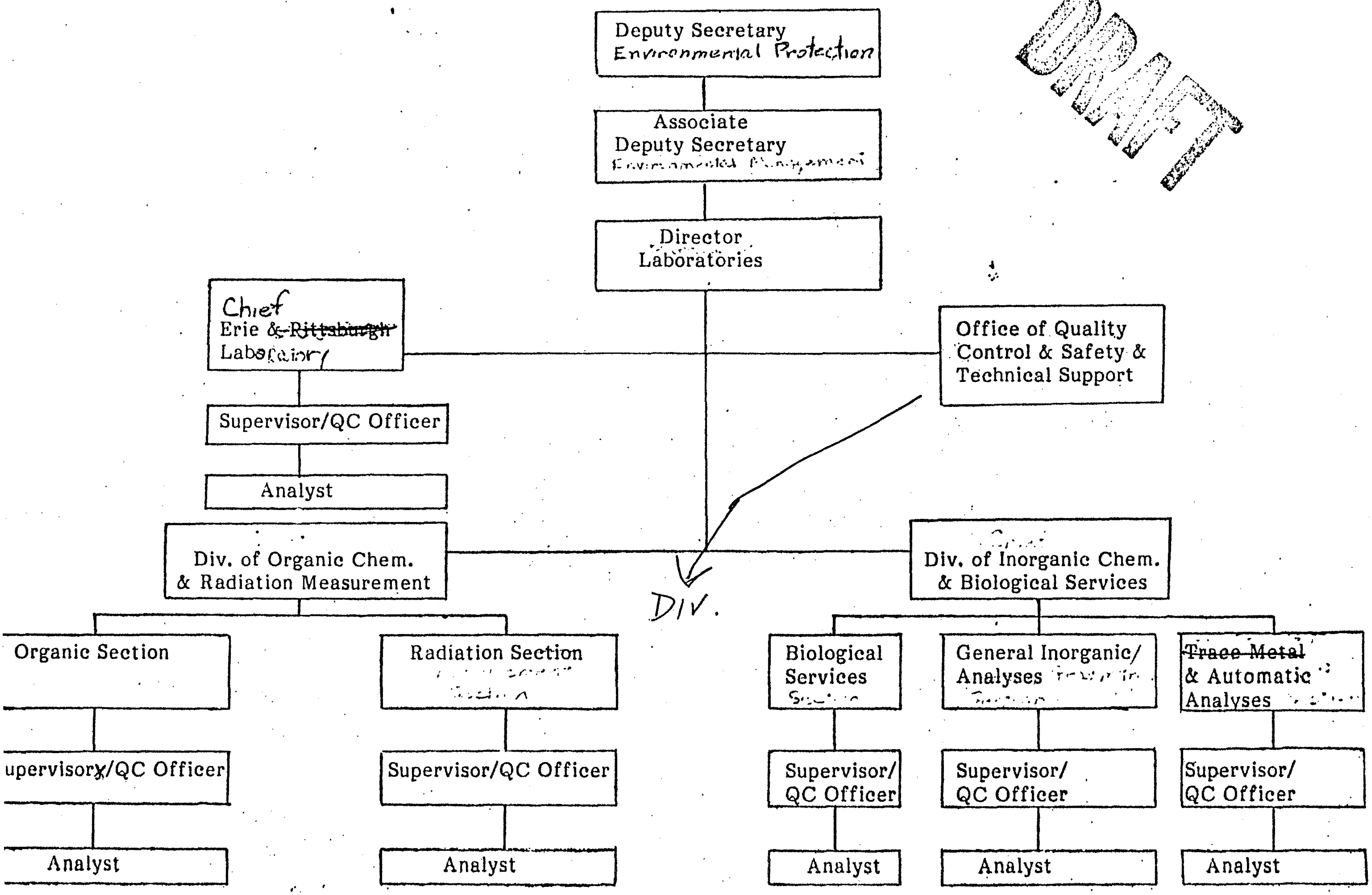
2.4.1.2 Monitors quality assurance activities to determine conformance with policy and procedures and with sound practice, and makes appropriate recommendations for correction and improvement as may be necessary.

Figure 2.1

Quality Assurance
Line and Staff Organization Chart

(Need to Redraft)

DRAFT



2.4.1.3 Seeks out and evaluates new ideas and current developments in the field of quality control and recommends means for their application wherever advisable.

2.4.1.4 Advises management in reviewing technology, methods and equipment with respect to quality assurance.

2.4.1.5 Coordinates schedules for all quality assurance checking procedures.

2.4.1.6 Evaluates data quality and maintains records on related quality control charts and other pertinent information.

2.4.1.7 Advises the purchasing group regarding quality of purchased materials, reagents and chemicals.

2.4.1.8 Advises field personnel on sampling techniques, preservation methods and shipping procedures to ensure valid samples.

2.5 The Quality Assurance System

Quality planning for the Bureau of Laboratories is designed to deliver acceptable data of a reasonable cost. Acceptable quality control data is defined in terms of accuracy, precision and reproducibility. Planning for quality assurance activities among the User Bureaus and the several groups within the Bureau of Laboratories is complex. The critical control points in the total measurement system must be identified and controlled.

2.5.1 Critical Control Points

These critical characteristics may be located in any one or all of following areas:

2.5.1.1 Sample collection.

2.5.1.2 Sample preparation.

DRAFT

2.5.1.3 Sample analysis.

2.5.1.4 Data processing.

2.5.1.5 Equipment and analyzers.

2.5.1.6 Analysts.

2.5.2 Specifications for Data

The quality of data considered acceptable must be defined as quantitatively as possible. The basic measures of the quality of analytical data used herein are accuracy, precision and reproducibility. Acceptance limits are being established for reproducibility, precision and accuracy of data reported by Bureau of Laboratories. These will yield acceptable levels of estimates of validity for all data. These acceptance limits are measurement/method specific.

Recommended acceptance limits, where available, are shown for each method in the Methods Manual.

2.6 Training

The goal of training is to train analysts in quality assurance principles and techniques to the extent that they will understand the usefulness of the principles and techniques and be able to apply them in the implementation of a comprehensive quality assurance program for the Bureau of Laboratories. All personnel involved in any function affecting data quality (sample preparation, analysis, data reduction, and quality control) should have sufficient training in quality assurance to contribute to the reporting of high quality data.

2.6.1 Course Topics

2.6.1.1 Basic areas of QA activities

2.6.1.2 Basic concepts of distribution and statistical control charts

2.6.1.3 Interpretation and use of control charts

2.6.1.4 Document control

2.6.1.5 The measurement process, with emphasis on calibration

2.6.1.6 Identification and treatment of outliers

2.6.1.7 Assessment of data precision and accuracy

2.6.1.8 The intralaboratory QC program

2.6.1.9 Performance audits

2.6.1.10 Data validation

2.6.1.11 Quality costs

2.6.1.12 Reports

SECTION

3

3.0 GENERAL ELEMENTS OF QUALITY ASSURANCE

3.1 Reagent and Equipment

Specific quality control requirements should be made for reagents and equipment to be utilized in an analytical procedure. The quality specified should be consistent with the intended use of the reagent or equipment. During start-up of a procedure, the analyst and supervisor should review the quality assurance elements for that procedure and identify those quality assurance elements that are most important. The records of acceptance testing should be available for review and approval by the Bureau of Laboratories Quality Assurance Coordinator/Officer. Reagent and equipment specifications should be checked upon receipt of purchases.

3.2 Reagent Quality Control

The following requirements are important to reagent procurement quality assurance:

3.2.1 Specification of reagent quality.

Methods contain specifications for each reagent critical to an accurate analysis.

3.2.2 Certification of grade of reagent.

All reagent manufacturers and suppliers should provide convenient certification of grade on a reagent bottle. This certification should meet or exceed the specifications for the procedure in question.

3.2.3 Certificate of analysis.

Standards or high purity reagents with critical specifications should include a certificate of analysis for the particular lot involved. The certificate should include the certified result for the characteristic measured, method of analysis, name of analyst and, where applicable, traceability of the measurement to a material or standard of higher accuracy than that purchased.

3.2.4 Reliability testing.

Before testing is started, in all cases it is necessary to run a reagent blank through the method in question to assure that the quality of the reagent is acceptable.

3.3 Equipment Quality Control

Equipment specifications in each method must be followed. The most common problems experienced in this area are with inadequate or incorrect equipment specifications.

3.3.1 Detailed specifications for equipment should include the following information:

3.3.1.1 List of essential characteristics

3.3.1.2 Method of measurement or test for each characteristic

3.3.1.3 Specific acceptability limits

3.3.1.4 Performance capability

3.4 Sample Integrity Checks

All samples received for analysis must be evaluated to ascertain that their condition is acceptable for reliable analysis. Control checks should be performed by the analyst during sample receipt and preparation procedures.

3.5 Data Reporting Procedures

3.5.1 Sources of Error

Measurements of the concentration of different compounds in environmental samples are assumed to be representative of the media at the time of the sample collection. The extent to which this assumption is valid depends on the sources of error and bias inherent in the collection, handling and analysis of the sample. Besides the sampling and analytical error and bias, human error may be introduced any time between sample collection and sample reporting. Included among the human errors are such things as failure of the analyst to record pertinent information, mistakes in reading an instrument, mistakes in calculating results and mistakes in transposing data from one record form to another. Data handling systems involving the use of computers are susceptible to keypunching errors and errors involving careless handling of magnetic tapes and other storage media. Although it cannot be completely avoided, human error can be minimized.

3.5.1.1 Laboratory Data Errors

The analyst in the laboratory reads measurements from balances, colorimeters, spectrophotometers and other instruments, and records the data on standard forms or in laboratory notebooks. Each time values are recorded, there is a potential for incorrectly entering results. Typical recording errors are transposition of digits (e.g., 216 might be incorrectly entered as 126) and incorrect decimal point location (e.g., 0.0635 might be entered as 0.635). This kind of error is difficult to detect. The supervisors must continually stress the importance of accuracy in recording results. Control limits contained in the method write-up and those shown in the quality assurance plan should be used by the analyst to invalidate or "flag" analysis data when results fall outside these limits.

3.5.1.2 Strip Chart Reading

Manual reduction of analytical data from strip charts can be a significant source of data errors. In addition to making those errors associated with recording data values on record forms, the individual who reads the chart can also err in determining the correct retention time or peak height. When instrument drift or interfering peaks are variable or large, it is difficult to determine concentration. Two people reading the same chart may obtain results that vary considerably.

Analysts responsible for reducing data from strip charts should be given training. After an analyst is shown how to read a chart, his results should be compared with those of an experienced analyst. Only after he has demonstrated the capability to obtain satisfactory results should an analyst be assigned to a data reduction activity.

Periodically the supervisor should check strip charts read by each analyst. Up to 10 percent of the data reported by each analyst should be checked, depending on time availability and history of error occurrence. If an individual is making errors, additional training may be necessary.

3.5.1.3 Data Logging Devices

The use of a data logging device to automate data handling is not a strict guarantee against data recording errors. Internal validity checks are necessary to avoid serious data recording errors. There are two sources of error between the instrument and the recording medium:

. The output signal from the detector.

. The errors in recording by the data logger.

The primary concern about the detector output is to ensure that only the detector signal and not electronic interferences be converted to a digital readout. Internal validity checks should be planned to "flag" spurious data resulting from electronic interferences.

3.5.1.4 Computational Errors

To minimize computational errors, operators and analysts should follow closely the formulae, calculation steps and examples given for each method, using the calculation instructions provided.

3.6 Control Charts

Procedures for reviewing data at the operational as well as the managerial levels should be provided. Review of measurement results from control samples used during analysis, for example, can indicate out-of-control conditions that would yield invalid data from subsequent analyses if the conditions are not corrected immediately. At the laboratory level, periodic review of data can indicate trends or problems that need to be addressed to maintain the desired level of precision and accuracy. One common tool for statistical analysis of data at both the operational and the managerial levels is the control chart.

The control chart provides a tool for discriminating between the systematic variation (assignable cause) and the system indeterminate variation (random). This technique displays data in a form that graphically compares the variability of all test results with the average or expected variability of small groups of data. The Bureau of Laboratories utilizes a type of Showhart control chart ($\overline{X}$ and r chart) for detecting trends and cycles with numerous data points. The major steps in constructing a control chart are outlined next and in greater detail in Section 5 of this handbook.

3.6.1 Constructing Control Charts

The steps to consider in the application of control charts are the following:

3.6.1.1 Select the analysis to audit. The critical control points are determined during quality planning and should be summarized in the quality assurance plan.

3.6.1.2 If check samples or reference samples are used, obtain the necessary materials.

3.6.1.3 Select the data quality objective to audit:

- Precision -- Use the range(r) deviation of the test results.

- Accuracy - Use the average deviation of test results from the accepted value of reference standards (Mean, $\bar{X}$).

3.6.1.4 Choose the audit frequency. Changes are detected more rapidly as the sampling frequency is increased. Audit rates of 7 percent are recommended for many characteristics of analytical procedures, but greater or lesser percentages may be utilized depending upon the priority and/or severity of variations found.

3.6.1.5 Set control limits. Control limits (CL) are normally (but not always) set at 3 times the standard deviation for r or $\bar{X}$. Control limits can be calculated using the computational formulae given in Section 5 of this handbook.

3.6.1.6 Set warning limits. Warning limits (WL) are normally (but not always) set at 2 times the standard deviation for r or $\bar{X}$. Warning limits can be calculated using the computational formulae given in Section 5 of this handbook.

3.6.1.7 The laboratory's control chart should be maintained by the computer or analyst or supervisor. The control chart should be kept up to date and continuously be evaluated by supervisory personnel.

3.6.2 Reading the Control Chart

The control chart is actually a graphical presentation of quality control effectiveness. A typical chart with indicated actions is shown in Figure 3.1. If the procedure is "in control", the results will almost always fall within the established control limits. Further, the chart will disclose out-of-control trends and cycles from assignable causes that can be corrected promptly.

After establishing 15 to 20 data points, the control limits should be established on the basis of these data. After this initial calculation, control limits should be recalculated every 3 to 6 months, or whenever significant data trends or shifts become obvious.

A more complete discussion of how to choose the type of control chart, how to determine control limits, how to determine subgroup size and how to interpret charts for out-of-control conditions is shown in Section 5 of this handbook. Use of r charts will also be explored.

3.7 Intralaboratory Quality Control

3.7.1 Function Checks

Function checks are performed to verify the performance of the analytical equipment. The analyst has written performance specifications for each function check, accompanied by recommended action if the specifications are not met.

3.7.2 Control Checks

Control checks should be performed during analysis. These checks are made along with each analysis or intermittently after a specified number of analyses. Some control checks are part of the routine analysis and are performed by the analyst to determine the performance of the analytical system. These control checks include the use of sample blanks to observe zero concentrations; fortified samples to determine percentage

$\bar{X}$ QUALITY CONTROL CHART

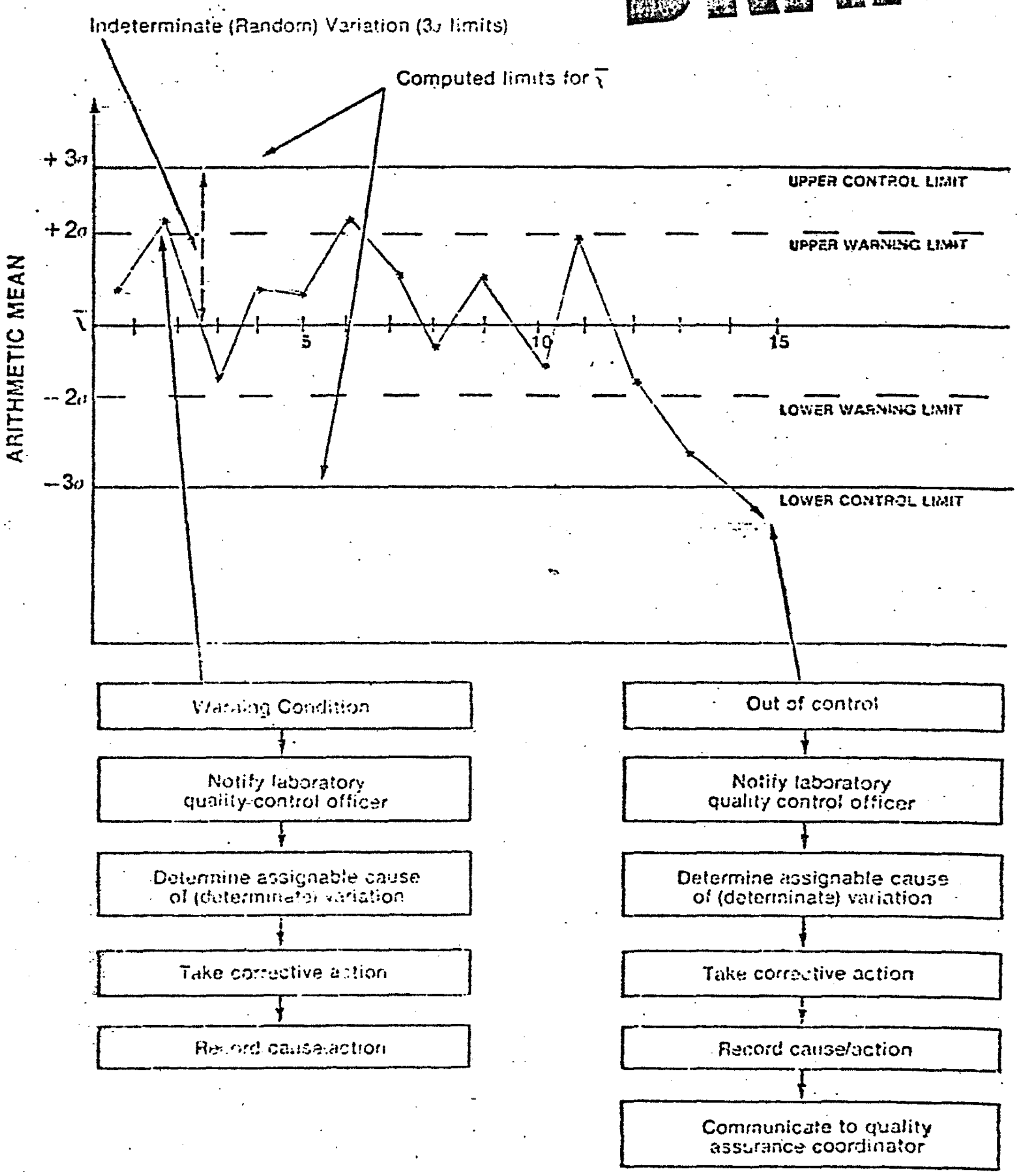


Figure 3.1 Quality Control Chart with Indicated Actions

of sample recovery through the entire analysis; and split-samples to observe within- and between-run variability for the entire analysis.

3.7.3 Split-Samples

Other control checks are performed by the analyst intermittently to quantitate analysis variability in terms of precision and accuracy. Control samples normally used for this purpose are split-samples to determine precision and standard reference materials and standard reference samples to determine accuracy in addition to precision.

3.7.4 Split-Sample Scheme

The procedure involves split-sample analyses performed on a staggered time schedule, which allows for a better appraisal of laboratory variability than if the duplicate is analyzed immediately after the original sample. If the variability of the analyst is being monitored during routine analysis, efforts should be made to submit control samples in a manner that the analyst does not give them special attention, i.e., blind to the analyst.

3.7.5 Control Charts

Results from function checks and split-samples should be recorded on control charts. This will allow the analyst and supervisor to know exactly when the analytical system is out of control, which part of the system is the probable cause and when a corrective action is to be taken.

SECTION

4

4.0 USE OF QUALITY ASSURANCE DATA

4.1 Corrective Actions

Corrective action procedures recognize the need for a Laboratory Quality Assurance Officer to monitor continually the effectivenss of the laboratory and the corrective actions. Suggested records of corrective action contained herein will serve to facilitate interlaboratory communication of common problems. Corrective actions are of two kinds:

4.1.1 On-the-Spot-Action

In a quality control program, one of the most effective means of preventing trouble is to respond immediately to indications of suspicious data or equipment malfunctions. Application of proper corrective actions at this point can reduce or prevent the collection of poor-quality data.

Established procedures for corrective actions are available for the methods when the performance limits are found to be exceeded (either through direct observation of the parameter or through review of control charts). Specific control procedures, calibration or preanalysis operational checks, etc., are designed to detect instances in which corrective action is necessary. Logical alternatives for tracing the source of analytical error should be provided to the operator by the supervisor. Trouble-shooting guides for analysts are generally found in instrument manufacturers' manuals. On-the-spot corrective actions routinely made by analysts should be documented as normal operating procedures, and no specific documentation other than notations in operations logbooks need to be made.

4.1.2 Long-Term Action

The purpose of long-term corrective action is to identify and eliminate causes of nonconformance. It is expected that they will be eliminated permanently. To improve data quality to an acceptable level and to maintain it at that level, it is necessary for the quality assurance system to be sensitive and timely in detecting out-of-control or unsatisfactory conditions. It is equally important that, once the conditions of unacceptable quality data are indicated, a systematic and timely mechanism is established to assure that the condition is reported to those who can correct it, and that a positive feedback loop is established to assure that the appropriate corrective action has been taken. For major problems, it is desirable that a formal system of reporting and recording of corrective actions be established.

4.1.3 Positive Feedback Loop

Experience has shown that most problems will not disappear until positive action has been taken by management. The significant characteristic of any good management system is the step that closes the loop - the determination to make a change if the system demands it. The following discussion outlines the considerations and procedures necessary to understand and implement an effective closed-loop corrective action system for major problems. Minor problems that can be corrected on the spot need not follow this procedure.

Effective correction action occurs when all laboratory areas and bureau staff members cooperate in a well-planned program. There are several essential steps that must be taken to plan and implement a corrective action program that achieves significant results.

Corrective actions should be a continued part of the laboratory system for quality, and they should be formally documented. Corrective action is not complete until it is demonstrated that the action has effectively corrected the problem. Diligent follow-up is probably the most important requirement of a successful corrective action system. Figure 4.1 illustrates an example of the sequence of activities involved in operating a closed-loop corrective action system.

4.2 Interlaboratory Testing

The purposes of interlaboratory testing are to identify those laboratories (and/or analysts) that are biased or having problems with a particular analysis, to indicate training needs and to estimate measurement method reproducibility

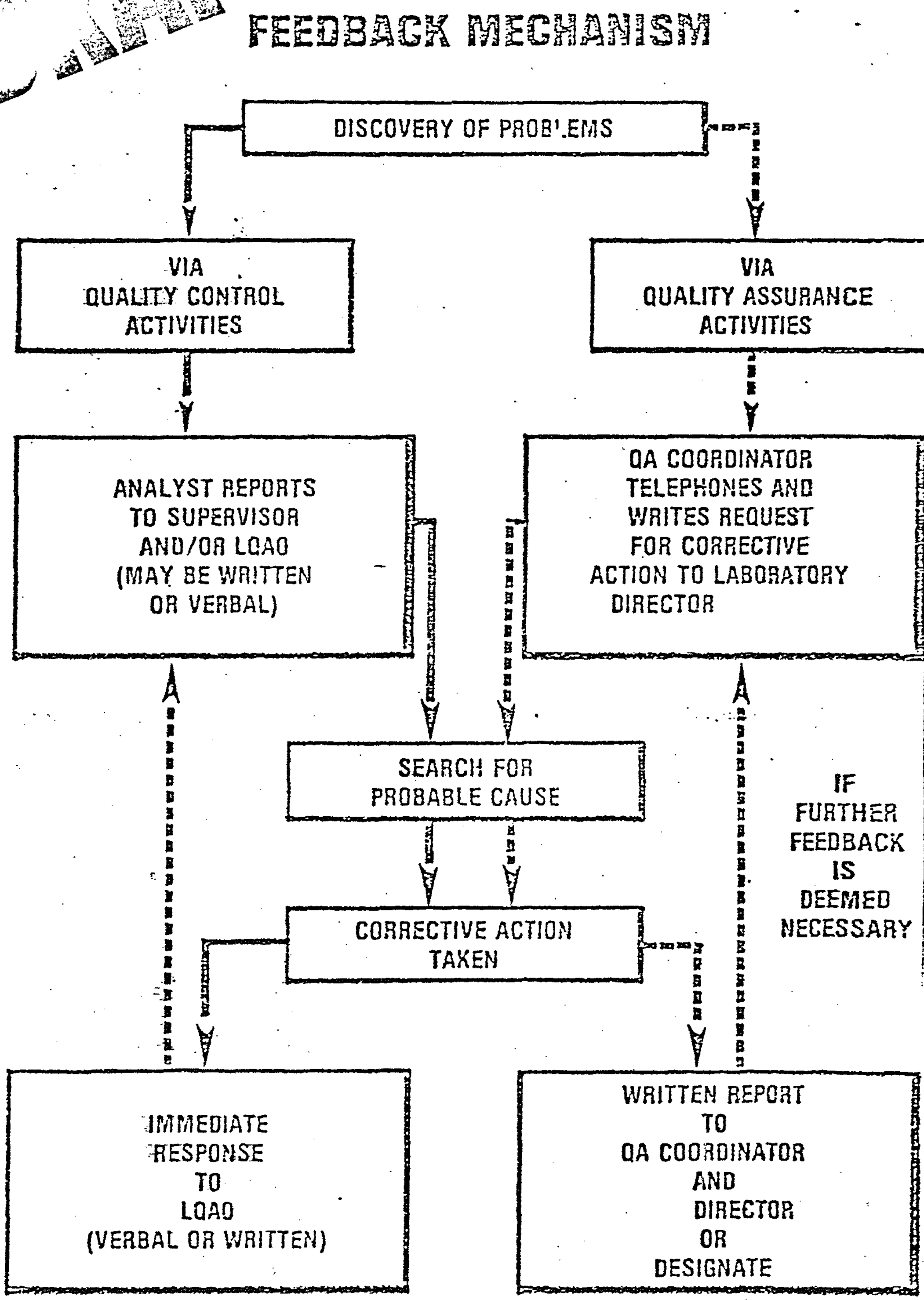


Figure 4.1 Feedback Mechanism

between laboratories. Laboratories participating in such programs are normally provided with reference samples and instructions for analysis. A coordinating laboratory prepares the samples. The Quality Assurance Coordinator evaluates the results. The Bureau of Laboratories participates with U. S. Environmental Protection Agency, U. S. Geological Survey and the International Joint Commission in interlaboratory testing.

4.3 Intralaboratory Testing

The purpose of intralaboratory testing programs is to identify the sources of measurement method error and to estimate their bias (accuracy) and variability (repeatability). Some of the potential error sources are the operator or analyst, equipment, the calibration and the operating conditions. The results may be analyzed by making comparisons against each other and/or against reference samples. Operator or analyst proficiency is an additional consideration for intralaboratory testing.

4.3.1 Proficiency Testing

Whereas many of the techniques employed in the conduct of an interlaboratory testing program are applicable in a modified form to intralaboratory testing, there are additional problems related to in-house proficiency testing of operators and analysts.

The major problems with designing a program to audit the analyst's proficiency are concerned with the following:

4.3.1.1 What kinds of samples to use.

4.3.1.2 How to prepare and introduce samples into the system without the analyst's knowledge.

4.3.1.3 How often to check the analyst's proficiency.

The problems and suggested solutions or decision criteria are given in Figure 4.2.

4.4 Check Samples

This section pertains to the use of several check samples for the purpose of performance evaluation and accreditation of laboratories. This section will be expanded when the Commonwealth of Pennsylvania assumes primacy for any of the various U. S. Environmental Protection Agency programs.

PROBLEM		SOLUTIONS AND DECISION CRITERIA
Kinds of samples	1.	Use replicate samples of unknowns or reference samples.
	2.	Samples must be exposed by the analyst to same preparatory steps as are normal unknown samples.
Introducing the sample	1.	Samples should have same labels and appearance as unknowns.
	2.	Because checking periods should not be obvious, supervisor and analyst should overlap the process of logging in samples or a third party be solicited.
	3.	Supervisor can place knowns or replicates into the system occasionally.
	4.	Save an aliquot from one day for analysis by another analyst. This technique can be used to detect bias.
Frequency of checking performance	1.	Consider degree of automation.
	2.	Consider total method precision.
	3.	Consider analyst's training, attitude, and performance record.

DRAFT

Figure 4.2 Problems in Assessing Analyst Proficiency.

DRAFT

4.5 Performance Audit

Performance audits are independent checks made by the supervisor or Quality Assurance coordinator or auditor to evaluate the quality of data produced by the analysis system. These audits are performed by the analyst independent of and in addition to normal quality control checks. Audits should be applied without the knowledge of the analyst, if possible, to ensure that results reflect normal operating conditions. Independence can be achieved by having the audit made by a different analyst from the one conducting the routine measurements.

Performance audits made by a different analyst than the one conducting the routine measurement may take several forms.

4.5.1 Instrument/standards audit - The auditor uses a separate standard and/or instrument to check these components.

4.5.2 Analysis audits - The auditor is provided a portion of several routine samples for analysis.

4.5.3 Data processing audits - The auditor spot-checks calculations and data validation procedures of the analyst.

4.6 System Audit

A system audit is an on-site inspection and review of the quality assurance system used for the total laboratory. Whereas performance audits are a quantitative appraisal, system audits are for the most part qualitative appraisals.

A system audit may be made at any time, unannounced or announced before it is conducted.

The procedure for making a system audit is:

4.6.1 Schedule.

4.6.2 Hold pre-audit meeting - Explain purpose of audit to as many laboratory personnel as can be spared to attend.

4.6.3 Conduct audit - Use check list.

4.6.4 Hold post-audit meeting - Before leaving site, tell those attending what was observed and what is intended for inclusion in audit report. Clear up any misunderstandings or misinterpretations.

4.6.5 Prepare written audit report.

4.6.6 Follow-up - Check for corrective action, if needed.

Audit Checklists to be

completed and included at

a future date.

4.7 Data Validation

Data validation is the process whereby data are accepted or rejected based on a set of criteria. This involves a critical review of a body of data in order to isolate and locate spurious values. It may involve only a cursory evaluation to detect extreme values or a detailed investigation requiring the use of a computer. In either situation, when a spurious value is located, it is not immediately rejected. Each questionable value must be checked for validity. Records of values that are either judged invalid or are otherwise suspicious should be maintained. These records are, among other things, a useful source of information for judging data quality.

4.7.1 Manual Methods

Both the analyst and the laboratory supervisor should inspect data. At regular intervals, daily or weekly, results should be scanned for questionable values. This type of validation is most sensitive to extreme values, i.e., either unusually high or low data, sometimes called outliers.

The criteria for determining an extreme value are derived from prior data obtained on the particular sample type. The data used to determine extremes may be the minimum and maximum values for all prior data from a particular analysis.

The time spent checking data that have been manually reduced by analysts depends on the time available and on the demonstrated abilities of the analysts to follow instructions. Recognized authorities suggest an audit level of 7 percent, i.e., checking 7 out of every 100 values.

4.7.2 Computerized Methods

A computer can be used not only to store and retrieve data but also to validate data. The system for checking extreme values in manual techniques also applies here. The criteria for extreme values can be refined to be specific for individual method codes.

Another indication of possibly spurious data is a large difference in concentrations reported for two duplicate samples.

4.7.3 Tools for Data Validation

The validation criteria for any process should ultimately be determined by the objectives for collecting the data. The validation criteria should be tailored along the lines suggested in Section 4.7 for varying analytical procedures.

There are a number of statistical tools that can be used in data validation.

4.7.3.1 Summary statistics - The means and the standard deviation are used to simplify the presentation of data and at the same time to summarize essential characteristics.

4.7.3.2 Frequency distributions - Used to present relatively large data sets, such as daily recoveries.

4.7.3.3 Estimation and testing procedures - Used to make inferences concerning the population of measurements made under the same conditions based on a small sample of data.

4.7.3.4 Outliers - Identified by appropriate statistical tests for outliers.

4.7.3.5 Audit data - Methods for treating performance audit data and for presenting the results in terms of accuracy (bias) and precision are included in Section 5.

4.7.3.6 Control charts - Computer-produced control charts, determination of limits and interpretation of plotted results are presented in Section 5.

4.7.3.7 Standard curve preparation - Calibration procedures represent one of the critical sources of measurement error. Section 5 has a discussion of standard curve preparation.

4.7.3.8 Repeatability and reproducibility tests - Identification of sources of measurement error within and among laboratories is one of the important functions of quality control data interpretation.

4.7.3.9 Tables - Statistical tables, where appropriate, are given in Section 5.

4.8 Quality Reports

Quality reports are necessary to provide the kinds of information commonly needed by management. Quality facts to be reported should be defined, and methods for summarizing and reporting data should be determined. Quality facts usually reported are:

4.8.1 Percentage duplication or replication of determinations.
Source: Methods Manual

4.8.2 Percentage voided samples versus total samples.
Source: Data validation, Section

4.8.3 System audit results.
Source: Audit Procedures, Section

4.8.4 Performance and results.
Source: Audit Procedures, Section

4.8.5 Interlaboratory test results and, where appropriate, intralaboratory test results (precision and accuracy).
Source: Inter- and Intralaboratory Testing, Section

4.8.6 Status of solutions to major quality assurance problems.
Source: Corrective Action, Section

DRAFT

Where applicable, quality control charts should be used to report results from performance audits, intralaboratory tests and interlaboratory test results. General principles to be considered in quality reports are the following:

4.8.7 In order to determine what periodic charts are needed by management, the Quality Assurance Coordinator should discuss with superiors and staff members what reports need to be produced on a regular basis to provide information required for rational decision-making.

4.8.8 In order to minimize errors in transmission, translation and interpretation, facts used in reports to management should be obtained from source documents whenever possible.

4.8.9 Facts should be presented in summary form. When not presented graphically, the report should provide abstracts of essential points.

4.8.10 Reports should compare current data with some base. The basic standard of comparison can be:

. Based on previous performance.

. Based on judgement.

4.8.11 The report should be understood at a glance. If the report is not presented graphically, essential points should be reduced to a single page. An example of a graphic report is shown in Figure 4.3.

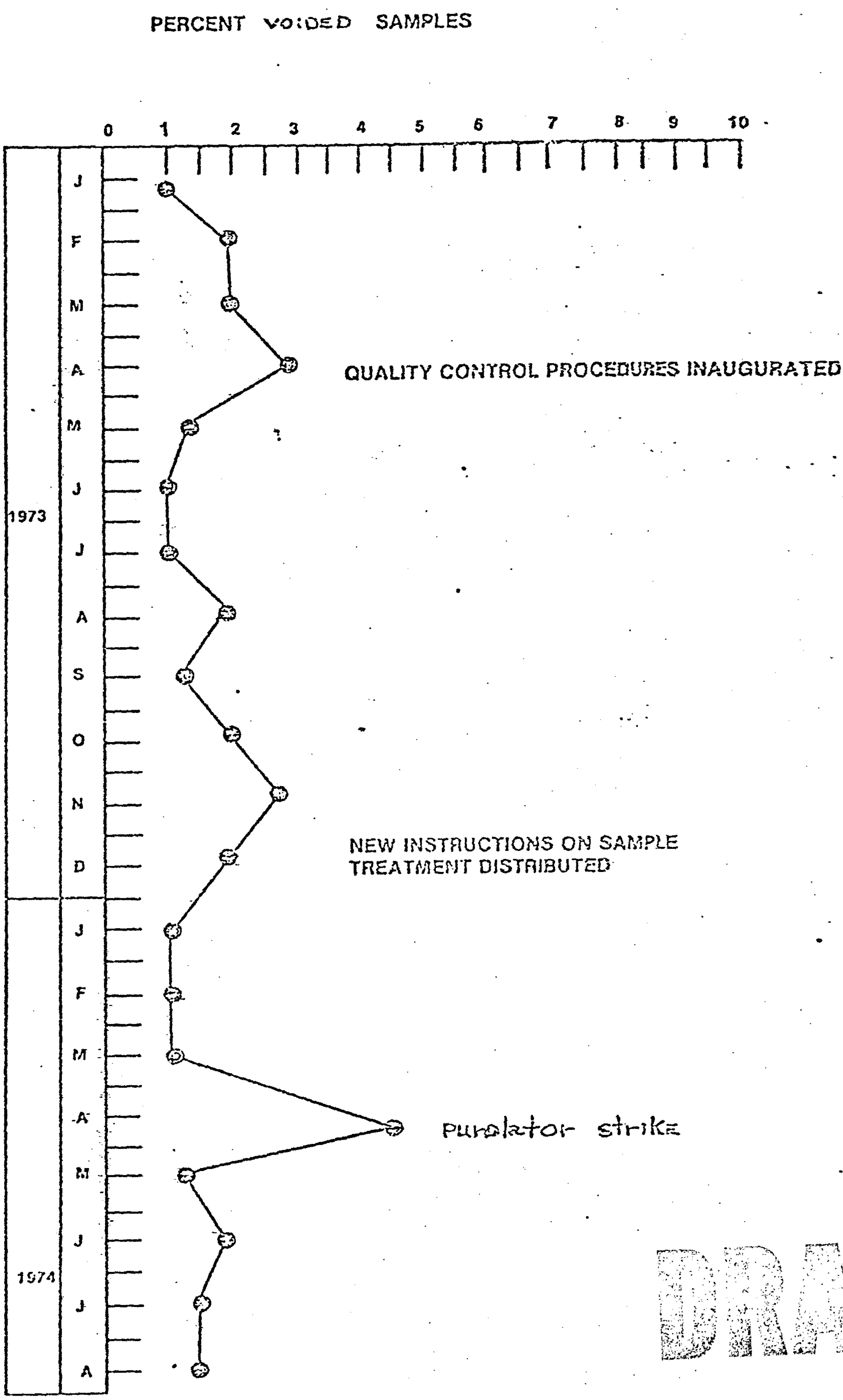


Figure 4.3 Example of Graphic Report to Management

SECTION

5

5.1 Descriptive Statistics

5.1.1 Arithmetic Mean

The most commonly used measure of central tendency. It is the computational average found by summing the values in a group of data and then dividing by the total number(n) of values in the set. See Figure 5.1

Formula: $\bar{X} = \frac{\Sigma X}{n}$

STEP	PROCEDURE	DIAGRAM
1	The data at the right is from 15 different observations of recovery by an analytical procedure. Compute the sum of the data.	See table below
2	Divide the sum found in Step 1 by the number of data points(n) n = 15	Mean ($\bar{X}$) = 1431 ÷ 15 $\bar{X}$ = 95.4
3	The symbol for arithmetic mean is $\bar{X}$ (pronounced X-bar). The arithmetic mean for this data set is 95.4	$\bar{X}$ = 95.4

Day No.	% Recovery
1	100
2	96
3	100
4	98
5	99
6	96
7	94
8	95
9	97
10	94
11	94
12	92
13	89
14	94
15	93
Sum of Data	1431

Figure 5.1 Arithmetic Mean

5.1.2 Standard Deviation

For a normal distribution, the standard deviation is the most important measure of dispersion. The algebraic formula for standard deviation is the square root of the quotient resulting from the number of items times the sum of the squared X's minus the sum of the X's squared, divided by the number of items times the number of the items minus one.

Formula: $$S = \frac{n\Sigma X^2 - (\Sigma X)^2}{n(n-1)}$$

See Figure 5.2

STEP	PROCEDURE	DIAGRAM
1	Consider the data for 15 days' recovery by an analytical procedure.	
	Square each recovery and sum.	
	Sum each recovery and square.	

Day No.	% Recovery	(% Recover[illegible])
1	100	10,000
2	96	9,216
3	100	10,000
4	98	9,604
5	99	9,801
6	96	9,216
7	94	8,836
8	95	9,025
9	97	9,409
10	94	8,836
11	94	8,836
12	92	8,464
13	89	7,921
14	94	8,836
15	93	8,649

$\Sigma X =$ 1,431 $(\Sigma X^2) = 136{,}649$

$(\Sigma X)^2 = 2{,}047{,}761$

2 Do the mathematics under the square root symbol

$$\frac{\cancel{n}\Sigma X^2 - (\Sigma X)^2/n}{\cancel{n}(n-1)}$$

$$\frac{136{,}649 - \frac{2{,}047{,}761}{15}}{15 - 1} = 9.4$$

3 Take the square-root of the quotient obtained in Step 2. The result will be the sample standard deviation.

$$S = \sqrt{9.4}$$

$$S = 3.07$$

DRAFT

Figure 5.2 Standard Deviation

5.1.3 Coefficient of Variation

A measure of dispersion frequently called the relative standard deviation. The ratio of the standard deviation to the mean is determined and multiplied by 100 to convert it to a percent of the mean. See Figure 5.3

Formula: $CV = \frac{S}{\bar{X}} \times 100$

STEP	PROCEDURE	DIAGRAM
1	The values at the right have been found for the sample date.	$S = 3.07$ $\bar{X} = 95.4$
	Using the formula given, find the CV.	$CV = \frac{S}{\bar{X}} \times 100$
2	Substitute the values for S and $\bar{X}$ into the formula and perform the indicated operations.	$CV = \frac{3.07}{95.4} \times 100$ $CV = 3.22$

DRAFT

Figure 5.3 Coefficient of Variation

5.2 Probability Distributions

5.2.1 The Normal (Gaussian) Curve

The normal curve is described by two parameters, the mean (μ) and the standard deviation (σ). The area under the normal curve between two specified ordinates is used to express the probability that a measureme from a normal population would fall in the interval bounded by the two ordinates. In Figure 5.4 note that each standard deviation is indicated the probability of occurrence. For example, one standard deviation is 0.3413. The probability of occurrence is 0.3413 that a value will be equal to or less than one standard deviation. This information has practical value, as statistical analysis is made easier through its use.

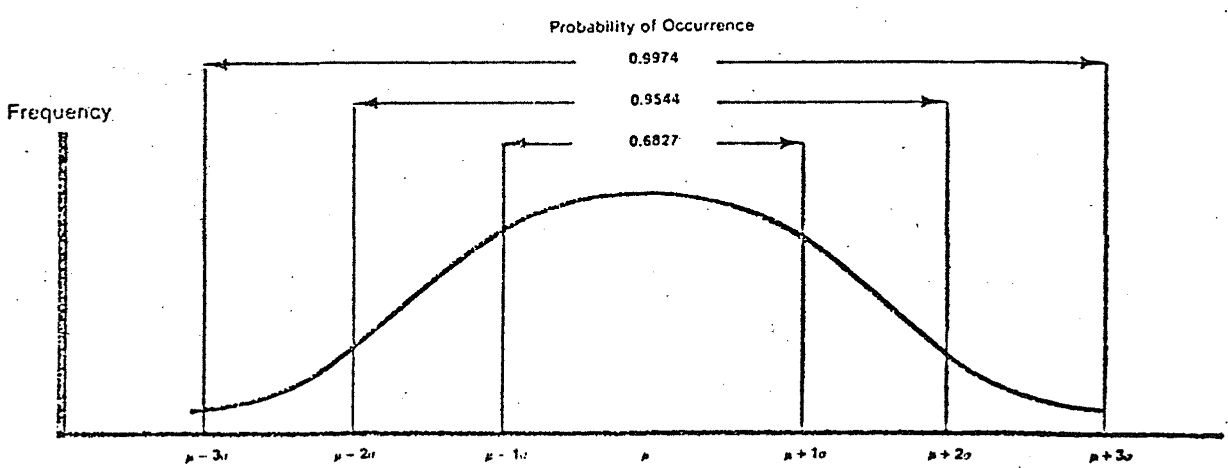


Figure 5.4 Probability of Occurrence between Specified Intervals

5.2.2 Setting Control Limits

For simplicity, quality control limits are usually taken to be 2S (σ) or 3S (σ) limits, corresponding to areas of 0.9544 and 0.9974 as given in Figure 5.3 In this case the limits are determined by

$$\bar{X} \pm 2\ (S/\ n)$$

or

$$\bar{X} \pm 3\ (S/\ n).$$

The 2S limits are referred to as warning limits and the 3S limits as control limits. As the sample size n increases, the limits become narrower. In practical applications the sample sizes n = 1 or 2 are most common.

5.3 Estimation Procedures

5.3.1 Confidence Interval

In the final interpretation and use of analytical data, one is frequently required to compare means. This can be done on the basis of the t test. Because the sample mean is not likely to be equivalent to the population mean, one must calculate two values such that there is a given confidence that the unknown value of the population mean will be within the interval between the two. The interval thus specified is referred to as a confidence interval. the probability statement for the width of the confidence interval for the mean when s is known is:

$$\bar{X} \pm \frac{ZS}{n}$$

$\bar{X}$ = sample mean

S = sample standard deviation

Z = factor dependent on the "confidence level"

Normally when using s from sample the factor should be the t factor, bu for cases where a large number of samples is used to develop control charts then the z factor may be used.

Z = 1.960 for 95% confidence interval.

5.3.2 Calculation of a 95% Confidence Interval

See Figure 5.5

STEP	PROCEDURE	DIAGRAM
1	Construct a 95% confidence interval estimate of the mean concentration based on a sample of 2 observations for which the mean and standard deviation are given at right.	95% confidence level $\underline{n}$ = 200 $\bar{X}$ = 10.50 pH units S = 0.14 pH units
2	the Z value for the 95% confidence level.	Z = 1.960
3	Evaluate $\frac{ZS}{n}$	$\frac{(1.960)(0.14)}{200} = 0.019$
4	Substitute the value of $\frac{ZS}{n}$ into the probability statement for the interval: $\bar{X} \pm \frac{ZS}{n}$	10.50 ± 0.02 $10.48 \leq \bar{X} \geq 10.52$ pH units
5	State the interval in words.	The interval 10.48 to 10.52 pH units is defined as being the 95% confidence interval for $\bar{X}$.

Figure 5.5 95% Confidence Interval

5.4 Outliers

In statistical literature, an unusually large or small value or measurement in a set of observations is usually referred to as an outlier. It will be assumed in th... discussion that the measurements are normally distributed and that the sample of size n measurements is being studied for the possibility of one or two outlier...

5.4.1 Reasons for Outliers

5.4.1.1 A faulty instrument.

5.4.1.2 An inaccurate reading of a record, dial, etc.

5.4.1.3 An error in transcribing data.

5.4.1.4 Calculation errors.

5.4.1.5 An actual value due to the unique circumstances under which the observation was obtained - an extreme manifestation of th... random variability inherent in the data.

5.4.2 Testing for Outliers

It is necessary to have some statistical procedure to test for the presence of an outlier in a set of measurements. The purpose of such testing is to:

5.4.2.1 Screen data for outliers and thus identify the need for closer control of the data generating process.

5.4.2.2 Eliminate outliers prior to analysis of the data. For example, the presence of outliers during the development of control charts would lead to limits that are too wide and would make the use of the control charts of minimal value. In most statistical analysis of data, e.g. regression analysis and analysis of variance, the presence of outliers violates a basic assumption of the analysis.

5.4.2.3 Prevent the incorrect conclusions that are likely to result if the outliers are not eliminated prior to data analysis.

5.4.2.4 Identify the real outliers due to unusual conditions of measurement.

5.4.3 Dixon Test

See Figure 5.6.

STEP	PROCEDURE	DIAGRAM
1	Arrange the set of n measurements in order of increasing size $X_1, X_2, X_3, X_4, \ldots X_n$	Nitrate Analysis (PPM)

Nitrate Analysis (PPM)

#1	#2	Difference
1.7	2.05	−0.35
2.2	2.4	−0.2
3.9	3.7	0.2
3.3	3.6	−0.3
2.7	3.3	−0.6
3.5	3.8	−0.3
0.9	1.46	−0.56
1.3	1.5	−0.2
6.1	6.4	−0.3
2.9	3.2	−0.3

2 In the example, the differences are to be tested. The largest value, +0.2, is questionable.

−0.6 → X_1
−0.56 → X_2
−0.35 → X_3
−0.3 → X_4
−0.3 → X_5
−0.3 → X_6
−0.3 → X_7
−0.2 → X_8
−0.2 → X_9 (or X_{n-1})
+0.2 → X_{10} (or X_n)

3 Compare the value 0.2 with the remaining data through use of Dixon test. Locate appropriate equation from Table 5.1 according to the number of data points(n).
n = 10

$$r_{11} = \frac{X_n - X_{n-1}}{X_n - X_2} = \frac{0.2 - (-0.2)}{0.2 - (-0.56)} = \frac{0.4}{0.76} =$$

r(10,5%) = 0.477

4 Compare value to value given in Table 5.1

$r_{11} = 0.53 > 0.477$

5 Infer that the measured difference is subject to question and that either result #1 is unusually large or #2 is unusually small.

Figure 5.6 Dixon Test

Table 5.1 Dixon Criteria for Testing of Extreme Observation.*

n	10%	5%	1%	Criterion
3	.886	.941	.988	$r_{10} = \dfrac{X_2 - X_1}{X_n - X_1}$ if smallest value is suspected; $= \dfrac{X_n - X_{n-1}}{X_n - X_1}$ if largest value is suspected.
4	.679	.765	.889	
5	.557	.642	.780	
6	.482	.500	.698	
7	.434	.507	.736	
8	.479	.554	.683	$r_{11} = \dfrac{X_2 - X_1}{X_{n-1} - X_1}$ if smallest value is suspected; $= \dfrac{X_n - X_{n-1}}{X_n - X_2}$ if largest value is suspected.
9	.441	.512	.635	
10	.409	.477	.597	
11	.517	.576	.679	$r_{21} = \dfrac{X_3 - X_1}{X_{n-1} - X_1}$ if smallest value is suspected; $= \dfrac{X_n - X_{n-2}}{X_n - X_2}$ if largest value is suspected.
12	.490	.546	.642	
13	.467	.521	.615	
14	.492	.546	.641	$r_{22} = \dfrac{X_3 - X_1}{X_{n-2} - X_1}$ if smallest value is suspected; $= \dfrac{X_n - X_{n-2}}{X_n - X_3}$ if largest value is suspected.
15	.472	.525	.616	
16	.454	.507	.595	
17	.438	.490	.577	
18	.424	.475	.561	
19	.412	.462	.547	
20	.401	.450	.535	
21	.391	.440	.524	
22	.382	.430	.514	
23	.374	.421	.505	
24	.367	.413	.497	
25	.360	.406	.489	

*Adapted from W. J. Dixon, "Processing Data for Outliers," Biometrics, March 1953, Vol. 9, No. 1, page 89.

5.4.4 Empirical Test - Hugh Error

If outlier is suspected:

5.4.4.1 Analyze data excluding the suspect value.

5.4.4.2. Compute the standard deviation.

5.4.4.3 Determine the deviation of the suspect value from the mean value.

5.4.4.4 Compare the difference with the standard deviation.

5.4.4.5 Reject suspect value of:

$$\frac{\text{Difference}}{s} \geq 4$$

DRAFT

5.4.5 Graphical Comparison

By the use of control charts outliers are identified by being outside the control limits (3 standard deviations).

5.5 Control Charts

5.5.1 In order for quality control to provide a means for separating the determinate (systematic) from the indeterminate (random) sources of variation, the analytical method must clearly emphasize those details that should be controlled to minimize variability. A check list would include:

5.5.1.1 Sampling procedures.

5.5.1.2 Preservation of the sample.

5.5.1.3 Aliquoting methods.

5.5.1.4 Dilution techniques.

5.5.1.5 Chemical or physical separations and purifications.

5.5.1.6 Instrumental procedures.

5.5.1.7 Calculating and reporting results.

5.5.2 The next step to be considered is the application of control charts for evaluation and control of the more important of these unit operations. Decisions relative to the basis for construction of a chart are required.

5.5.2.1 Select the variables to be measured.

5.5.2.2 Choose the method of measurement.

5.5.2.3 Select the objective:

- Control of variability or precision.
- Control of accuracy of measurements.
- Control of completeness of reported data.
- Control of percentage of defective measurements.

5.5.2.4 Select the size and frequency of subgroup samples:

- Size - The analyst will often be dealing with samples of 2.
- Frequency of subgroup sampling - Changes are detected more quickly as the sampling frequency is increased.

5.5.3 Shewhart Control Chart

Important features of this type chart are:

5.5.3.1 Measurement performed - Record the parameter measured and the method of measurement.

5.5.3.2 Measurement units - Metric units.

5.5.3.3 Date.

5.5.3.4 Sample number.

5.5.3.5 Measurement results.

5.5.3.6 Comments - Note important observations and/or corrective actions taken, e.g., "instrument recalibrated." Comments should be entered when the measurement system is out of control and subsequent corrective action is taken.

5.5.4 Control Limits

The determination of control limits can be based on the capability of the procedure itself as known from past experience or in the specified requirements of the measurement procedure. Common practice sets the limits at the mean $\pm$ 3 standard deviations.

The Shewhart control chart is actually a graphical presentation of quality control efficiency (Figure 5.7). If the system is "in control," the results will almost always fall within the established control limits. Further, the chart will disclose trends and cycles from assignable causes, which can be corrected.

The basic procedure of the control chart is to compare "within group" variability to "between groups" variability. For a single analyst running a procedure, the "within group" may well represent one day's output and the "between groups" represent day to day variability.

5.5.5 Construction of Control Charts

The $\bar{X}$ and r charts provide a tool for distinguishing the pattern of indeterminate (random) variation from the determinate (assignable cause) variation. This techique displays data from a method in a form that graphically compares the variability of all test results with the average or expected variability of small groups of data – in effect, a graphical analysis of variance, and a comparison of the "within group" variability versus the "between groups" variability. Figure 5.7 is an example based on data obtained over 17 days. The data represent measurements of the same standard reference sample over the days.

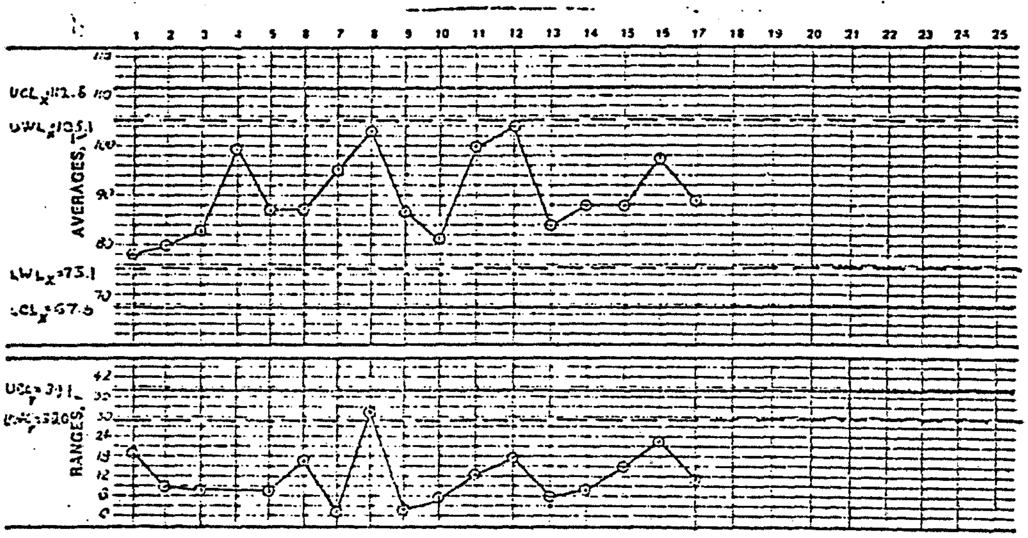


Figure 5.7 Shewhart Control Chart

5.5.5.1 r Charts

The use of range(r) in place of standard deviation(5) is justified for sample size $n \leq 10$ since r is nearly as efficient as 5 in estimating σ, and r is easier to calculate.

STEP	PROCEDURE	DIAGRAM

1 Utilizing the data at the right, calculate $\overline{X}$ and the percent difference from mean.

Day	Duplicate	Results	$\overline{X}$	% Dif. (P)
1	87.6	68.1	77.9	12.58
2	85.2	75.6	80.4	5.97
3	87.6	79.2	83.4	5.04
4	98.7	-	-	-
5	83.7	90.6	87.2	4.01
6	79.2	95.4	87.3	9.28
7	95.4	94.5	95.0	0.53
8	118.2	87.3	102.8	15.08
9	85.8	87.6	86.7	1.04
10	84.0	78.6	81.3	3.32
11	93.6	105.6	99.6	6.02
12	112.8	95.4	104.1	8.36
13	80.7	87.0	83.9	3.81
14	92.1	84.0	88.1	4.65
15	95.7	80.4	88.1	8.74
16	86.7	108.6	97.7	11.26
17	83.4	94.2	88.8	6.08
			$\Sigma P =$	105.77

2 Calculate $\overline{P}$, $(\Sigma P)^2$, and SP^2 from the above data.

$$\overline{P} = \frac{\Sigma P}{n} = \frac{105.77}{16} = 6.61$$

NOTE: Although there are 17 days, the data for day 4 is incomplete. Therefore, n = 16

$$(\Sigma P)^2 = (105.77)\ (105.77) = 11187.29$$

$$\Sigma P^2 = P_1^2 + P_2^2 + \ldots\ldots P_n^2 = 943.71$$

3 Calculate the standard deviation.

Formula:

$$s = \frac{\Sigma P^2 - (\Sigma P)^2/n}{n-1}$$

$$s = \frac{943.71 - \frac{11187.29}{16}}{15}$$

$$s = 4.04$$

Warning limit = 2 Std. Dev. WL = 8.08

Control limit = 3 Std. Dev. CL = 12.12

DRAFT

Figure 5.8 r Charts

5.5.5.2 $\bar{X}$ Charts

STEP	PROCEDURE	DIAGRAM

1 Utilizing the data at right, calculate the percent difference from the theoretical value, $(\Sigma P)^2$, ΣP^2

Theoretical Value = 100.0

n = 10

Day	Result	P	P^2
1	99.0	99.0	9801.0
2	98.0	98.0	9604.0
3	99.5	99.5	9900.25
4	100.0	100.0	1000.0
5	105.0	105.0	11025.0
6	97.5	97.5	9506.25
7	100.0	100.0	1000.0
8	101.0	101.0	10201.0
9	100.5	100.5	10100.25
10	96.0	96.0	9216.0

$\Sigma P = 996.5$ $\quad \Sigma P^2 = 99353.75$

$(\Sigma P)^2 = 993012.25$

2 Calculate $\bar{P}$

$$\bar{P} = \frac{996.5}{10} = 99.6$$

Formula:

$$\bar{P} = \frac{\Sigma P}{n}$$

Calculate standard deviation.

$$s = \frac{99353.75 - \dfrac{993012.25}{10}}{9}$$

Formula:

$$s = \frac{\Sigma P^2 - (\Sigma P)^2/n}{n-1}$$

$s = 2.42$

Upper Warning Limit = $\bar{P}$ + 2 std. dev. UWL = 104.4

Upper Control Limit = $\bar{P}$ + 3 std. dev. UCL = 106.9

Lower Warning Limit = $\bar{P}$ - 2 std. dev. LWL = 94.8

Lower Control Limit = $\bar{P}$ - 3 std. dev. LCL = 92.3

Figure 5.9 $\bar{X}$ Charts

5.5.6 Interpretation of Control Charts for Out-of-control

Various criteria have been used to determine when the measurement system is out-of-control. The more important criteria for out-of-control are as follows:

5.5.6.1 One or more points outside the control limits.

5.5.6.2 A run of 2 or more points outside the warning limits.

5.5.6.3 A run of 7 or more points. This might be a run up or a run down or simply a run above or below the central line on the control chart.

5.5.6.4 Cycles or nonrandom patterns in the data. Such patterns may be of great help to the experienced analyst.

5.6 Linear Instrument Calibration - Standard curve preparation is frequently accomplished with readings from an instrument plotted against known concentrations. For a first approximation of the standard curve, a straight line may be drawn through the plotted data points. For quantitative analysis an unbiased, reproducible calibration line is required.

5.6.1 Computational Formulas

5.6.1.1 Straight line

$$\underset{\text{(instrument response)}}{y} = \underset{\text{slope}}{m}\ \overset{\text{concentration}}{x} + \underset{\text{ordinate intercept}}{b}$$

5.6.1.2 Slope of a straight line

$$m = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - (\Sigma x)^2}$$

5.6.1.3 Intercept (background signal)

$$b = \frac{\Sigma y}{n} - m\frac{\Sigma x}{n}$$

5.6.1.3 Standard error of regression - This is an estimate of the scatter of the points about the calculated line.

$$S_r = \frac{1}{n-2} \quad \Sigma y^2 \quad - \quad \frac{(\Sigma xy)^2}{\Sigma x^2}$$

5.6.2 Significant Figures - The digits required to express a measurement or a calculated result to the correct certainty are referred to as significant figures. A significant figure has reasonably certain accuracy from actual measurement. If a measured peak height is found to be 5.25 cm, units and tenths can be read from a ruler with reasonable certainty, the hundredths are estimated, and the measurement is accurate to three significant figures.

When multiplying, dividing, or exponentiating, the number of significant figures is the same as the least accurate number used to calculate it. When adding or subtracting, round the more accurate number to the same decimal place as the least accurate quantity.

5.6.3 Rounding Numbers - Frequently, calculated results carry one, two, three or more extra nonsignificant figures. Results should be rounded off to the number of actual significant digits; any digits beyond that place should be dropped.

SECTION

6

6.0 REFERENCES

Ballinger, D. G., et. al., Handbook for Analytical Quality Control in Water and Wastewater Laboratories, EPA 600/4-79-019, Environmental Monitoring and Support Laboratory, Cinc., Ohio 45268, 1979.

Chemistry Quality Assurance Handbook, Vol. 1: Principles, U.S. Department of Agriculture.

Control Chart Method of Controlling Quality During Production. ANSI Standard 21.3.

Goel, A. L., and Wu., S. M., "Determination of A.R.L. and a Contour Nomogram for Cusum Charts to Control Normal Mean," Technometrics, Vol. 13, No. 2 May 1971.

Kelley, W. D. Control Chart Techniques. Statistical Method Evaluation and Quality Control for the Laboratory. U.S. DHEW, Public Health Service, Cinc., OH August 1968.

Natrella, M. G. Experimental Statistics, National Bureau of Standards Handbook 91, Washington, D.C. 20234.

Quality Assurance Handbook for Air Pollution Measurement Systems. Vol. 1: Principles EPA 600/9-76-005 March 1976.

Taylor, J. K. Quality Assurance of Chemical Measurements, Seminar Materials, National Bureau of Standards, Washington, D.C. 20234.

CHAIN-OF-CUSTODY

STANDARD OPERATING PROCEDURES

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

ENVIRONMENTAL PROTECTION DEPUTATE

HARRISBURG, PENNSYLVANIA 17120

FINAL APPROVAL ON NOVEMBER 15, 1984

CHAIN-OF-CUSTODY

STANDARD OPERATING PROCEDURES

PA Department of Environmental Resources
Environmental Protection Deputate
Harrisburg, PA 17120

Approvals:

Deputy Secretary (EP)
Associate Deputy (EP
Bureau Director (Labs)
Bureau Director (M&R)
Bureau Director (WQM)
Bureau Director (SWM)
Bureau Director (CEC)
Bureau Director (RP&T)

QA Officer (Labs) Paul E. Baker
QA Officer (M&R) D. P. Thompson
QA Officer (WQM)
QA Officer (SWM)
QA Officer (CEC)
QA Officer (RP&T)

TABLE OF CONTENTS

1.1 LIST OF FIGURES

1.2 INTRODUCTION

An essential part of any sampling/analytical scheme is ensuring the integrity of the sample from collection to data reporting. This includes the ability to trace the possession and handling of samples from the time of collection through analysis and final disposition. This documentation of the history of the sample is referred to as Chain of Custody.

Chain of custody is necessary if there is <u>any</u> possibility that the analytical data or conclusions based upon analytical data will be used in litigation. In cases where litigation is not involved, many of the chain-of-custody procedures are still useful for routine control of sample flow. The components of chain of custody (sample seals, a field log book, chain-of-custody record, and sample analysis request sheet) and the procedures for their use are described in the following sections.

1.3 FIELD LOG BOOK

The collector should maintain a field notebook which is to include a standardized sample log sheet containing the information from the sample label and seal, plus the type and volume of containers used. An outline of the collection process and any field measurements and relevant observations are to be recorded in the field notebook.

1.4 SAMPLE LABELS

Sample labels (Figure 1) are necessary to prevent misidentification of samples. Labels should be affixed to sample containers prior to or at the time of sampling. The labels should be filled out at the time of collection. Gummed paper or tape labels or tags are adquate and should include at least the following information:

sample number
name of collector
date and time of collection
location of collection area
preservation

SAMPLE # ______________________ DATE ____________

COLLECTOR ______________________ TIME ____________

LOCATION ____

COUNTY __________________ MUN. __________________

ANALYSIS ____

COMMENTS ____

Collector ____________________________________ Sample No. __________________

Place of Collection ____

____

Date Sampled _________________________________ Time Sampled __________________

Field Information ____

____

____

Figure 1. Examples of Sample Labels

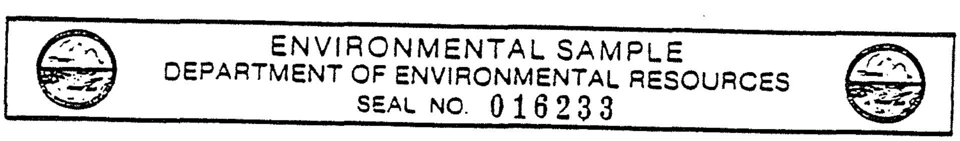


Figure 2. Example of Sample Seal

1.5 SAMPLE SEALS

Sample seals must be tamper-proof. Gummed paper seals may be used for this purpose. The seal must be an official DER seal which has a unique seal number printed on it. (Figure 2)

When the sample is collected and preserved properly the legal seal must immediately be placed over the top of the sample container in a manner that would require destruction if tampered with. The number of the official seal must be recorded in the field log book and on the sample analyses sheet (see Figure 5) or other chain of custody log.

1.6 CHAIN OF CUSTODY RECORD

The sample collector is responsible for the samples until they are delivered to the lab or released to another custodian, such as a Purolator courier. Thus the samples must be in the collector's physical possession, or in his view at all times, or locked in a secure place. The samples should be delivered to the lab in appropriately sealed and labeled delivery containers by the most timely and efficient means.

Samples are delivered to the Harrisburg or Erie Laboratories in one of two ways:

1. By Purolator Courier Service from DER regional or county offices.

2. Hand carried from field.

Purolator Courier Service Procedure - Note: Purolator Courier Service is a Nationwide bonded carrier service.

1. Purolator on a routine basis Monday through Thursday picks up from either a locked vault or a locked office in any DER county or regional office all samples that are to be delivered to the Harrisburg or Erie Laboratories. The Courier signs the bill of lading (Fig. 3) a copy of which remains in the vault for the shipper.

2. All samples picked up by Purolator remain in their custody until they are delivered to the Harrisburg or Erie Laboratory, usually for about 14 hours to 15 hours.

3. a. A Purolator delivers all samples to the Harrisburg Laboratory located in the Evangelical Press Building at the corner of Third and Reilly Streets, Harrisburg, Pennsylvania. The samples are delivered to the Susquehanna street entrance.

   b. Purolator deliver all samples to the Erie Laboratory located at 712 Maryland Avenue, Erie, PA.

Each custodian must sign and date the chain of custody record upon release or receipt of sample. An example of one type of chain of custody log is shown in Figure 4.

ORIGINAL COPY

21408501 **Purolator** Courier Purolator Courier Corp.

UNIFORM STRAIGHT BILL OF LADI
ORIGINAL NOT NEGOTIABLE

DATE	SHIPPER	CHECK IF ☐ HIWAY PAK

It is mutually agreed that goods herein described are accepted in apparent good order (except as noted) for transportation as specified herein.
Common carriage: Shipments subject to rules, classifications and tariffs, in effect as of the date hereof, which are filed in accordance with law, copies of which are available for inspection, are hereby incorporated into and made part of this contract.
Contract carriage: Shipments subject to applicable contract between shipper and carrier in effect as of the date hereof. Absent contract, liability limited to $250.

Unless a greater value is declared hereon, the shipper hereby agrees and declares that the value of the property described herein is released to a value not exceeding $250 per shipment.

DECLARED VALUE

CONSIGNEE NAME AND ADDRESS	COMMODITY	BAGS	ENVS.	BOXES	OTHER	WEIGHT	P.C.C. USE CHARGES

WAITING TIME HRS. MIN.	WAITING CHARGES	SPECIAL CHARGES	TOTAL PIECES	TOTAL CHARGES

SHIPPER SIGNATURE		COURIER SIGNATURE		ROUTE NO	CONSIGNEE SIGNATURE	
DATE	TIME AM PM	DATE	TIME AM PM		DATE	TIME AM PM

UBL-6A
Rev. 1/82

Figure 3

CHAIN OF CUSTODY RECORD

				SAMPLERS (Signature)					
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE Water Comp.	Grab.	Air	SEQ. NO	NO. OF CONTAINERS	ANALYSIS REQUIRED

Relinquished by: (Signature)		Received by: (Signature)	Date/Time
Relinquished by: (Signature)		Relinquished by: (Signature)	Date/Time
Relinquished by: (Signature)		Received by: (Signature)	Date/Time
Received by: (Signature)		Received by Mobile Laboratory for field analysis: (Signature)	Date/Time
Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
Method of Shipment:			

Distribution: Orig.—Accompany Shipment
1 Copy—Survey Coordinator Field Files

Figure 4

1.6.1 Laboratory Procedure for identification, inspection and handling of samples.

A. Each sample that is received by the laboratory is acted upon as soon as received by designated employees.

B. Each sample that is received by the laboratory is accompanied by a "Water or Waste Quality Report Form" either ER-BWQ-13 or ER-BWQ-13-1 (Figures 5, 6, 7) or "Bacteriological Report for Drinking Water" (ERBL 179). These forms contain specific information about the sample it accompanies:

1. Collectors sample number - each DER field person is assigned a four digit number, this plus a three digit sample number combine to form the collectors sample number which is then unique for each sample received. This collectors sample number also appears on the accompanying sample. This identifies the sample.

2. Collectors request for analyses to be performed by the Laboratory.

3. Pertinent information such as date of collection, point of collection, etc.

4. Some of the more recent forms contain a custody log where the legal seal number if any, is recorded. This legal seal number corresponds to the number that appears on the legal seal that secures the bottle. Older forms do not have a custody log so the collector notes the legal seal number on some conspicuous spot on the form. The designated laboratory employee will note the condition of the legal seal on the bottle and will indicate on the accompanying report form if the seal has been broken or tampered with. This is done at the initial inspection.

5. A particular sample may require several types of analysis that require specific sample pre-treatment and thus require separate bottles, this is a sample group, each of these bottles may require a legal seal, this information also appears on the report form and the laboratory person takes appropriate action to note condition of seals, etc.

C. After properly identifying and inspecting each sample (physical condition and preservation) and accompanying report form, a unique laboratory number is then assigned to each sample or sample group and its accompanying report form. This laboratory number then becomes the primary identifier of that sample from that point on.

1. An appropriate Laboratory Log form is maintained which includes: collector number, lab number, collector name, date received, etc.

2. Samples along with specific work lists are then distributed to the various work units and the proper analytical actions are started.

Each concerned Chemist or Technician is informed that his samples have arrived and he or she takes over custody.

3. The samples remain in the laboratory until all the required work has been completed. The laboratory is secured at the end of each work day by locking of all entrances. No one is permitted in the laboratory once it is locked. There is a special Sonitrol Security System designed for the Harrisburg Laboratory in operation. The Erie Lab is not equipped with this.

Fixed Samples

ER BL-12
REV. 1-82

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF LABORATORIES

WATER OR WASTE QUALITY REPORT

ALL CHEMICAL ANALYSES EXPRESSED IN MG/L UNLESS OTHERWISE SPECIFIED

LAB Number ______

Date Received ______

ESTABLISHMENT	CASE	FACILITY	COLL NUMBER

COUNTY	MUNICIPALITY	PROGRAM	COLL NAME	TYPE TR	STD ANALYSIS

CARD (3)	ID CODE (ALL CARDS) 4-16: Cnty / Mun / T / Est / Case / Fac	LATITUDE 4-10	LONGITUDE 11-18	DATE 19-24: M / D / Y	TIME 25-28: Hr / Min	KIND 29
2			0			

USGS (30-34)	BUREAU 35-37 AMIS	SAMPLE NUMBER 38-43	STREAM NAME 44-57	RELATIVE POINT 58

TRIBUTARY TO: ______ ADDITIONAL LAB ANALYSES

FULL DESCRIPTION WHERE SAMPLE TAKEN

FIELD ANALYSES

Type Sample	59-60	
Source of Sample	61-62	
Reason Sampled	63-64	
Composite Sample: Proportional / Uniform	65	
Temporal / Spatial	66	
Aliquots	67-68	
Flow: Estimated / Measured	69	
Condition: Above - 1, Normal - 2, Flood - 5, Below - 3, No Flow - 4	(CARD 2) 80	
Stream Flow-CFS	(00061)	
Stream Flow-MGD	(50051)	
Pipe Flow-MGD	(50050)	
Gage Reading-Ft	(00065)	
Temp (C)	(00010)	
pH	(00400)	
D O	(00300)	
Cl (50060)		
Hal: Br (71871)		
I (71866)		
Spec Cond	(00094)	
Appearance	(46001)	
Odor	(01330)	

CUSTODY LOG

How Shipped ______ Date ______
Legal Seal No. ______
Received by ______
Condition of Seal ______

LAB ANALYSES

Chemist ______ Date Analyzed ______

Color	(00080)	
Turb	(00070)	
pH	(00403)	
Spec Cond	(00095)	
Alk	(00410)	
pH4	(00436)	
pH8: Hot / Cold	(70508) / (00435)	
T O C	(00680)	
C O D	(00340)	
5-Day BOD	(00310)	
P: T / TO	(00665) / (00666)	
Al-Tot ug/l	(01105)	
Cd-Tot ug/l	(01027)	
Cr-Tot ug/l	(01034)	
Cu-Tot ug/l	(01042)	
Fe-Tot ug/l	(01045)	
Mn-Tot ug/l	(01055)	
Ni-Tot ug/l	(01067)	
Pb-Tot ug/l	(01051)	
Zn-Tot ug/l	(01092)	

Total Solids	(00500)	
Susp. Solids	(00530)	
Set Solids	(00545)	
Total Diss Solids	(70515)	
NO_2 N	(00615)	
NO_3 N	(00620)	
NH_3 N	(00610)	
Kjel-N	(00625)	
Hardness	(00900)	
Ca	(00916)	
Mg	(00927)	
SO_4	(00945)	
Cl	(00940)	
F	(00951)	
MBAS	(38260)	
Phenols ug/l	Dr (46002) / Ds (32730)	
Cyanide	(00720)	

Figure 5

ER-LAB-13.1
8/81

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF LABORATORIES
SPECIAL ANALYSES REPORT

Lab Number ____________

Date Received ____________

ADDITIONAL LAB ANALYSES

CUSTODY LOG

How Shipped ____ Date ____

Legal Seal No. ____

Received by: ____

Legal Seal Condition: ____

QUALITATIVE REPORT

DO NOT WRITE BELOW THIS LINE

QUANTITATIVE RESULTS

ANALYSIS:	UNITS:	ANALYSIS CODE	RESULTS (SHOW DECIMAL POINTS ON LINES)

ANALYST ____________ DATE ____________
SIGNATURE

Figure 6

Commonwealth of Pennsylvania
Department of Environmental Resources
Bureau of Laboratories

ERBL 179
Rev 3 81

BACTERIOLOGICAL REPORT FOR DRINKING WATER

TO BE COMPLETED BY COLLECTOR   MAKE CHECKS PAYABLE TO COMMONWEALTH OF PENNSYLVANIA D E R
(OWNER AND ADDRESS OF WATER SUPPLY)

M

NAME

ADDRESS

CITY BOROUGH or TOWNSHIP

STATE

ZIP CODE

COUNTY

HOUR COLLECTED

DATE COLLECTED

SOURCE OF SUPPLY (DRILLED WELL DUG WELL SPRING CISTERN ETC)

SAMPLE LOCATION (KITCHEN FAUCET OUTDOOR TAP BARN ETC)

TREATMENT OF SUPPLY

☐ NONE ☐ CHLORINATED ☐ FILTRATION ☐ SOFTENER ☐ OTHER

MAIL REPORT TO (Please print Name and Address)

ZIP CODE

LOCAL OFFICE USE

AGENCY

COUNTY

☐ PAID

☐ REPLACEMENT

DATE

A WATER SUPPLY THAT PERMITS THE ENTRANCE OF ANIMALS SURFACE WATER KITCHEN LAUNDRY OR TOILET WASTES IS NOT ADEQUATELY PROTECTED AND SHOULD NOT BE SAMPLED SUPPLIES HAVING PUMPING EQUIPMENT WHICH MUST BE FREQUENTLY PRIMED ARE NOT ADEQUATELY PROTECTED BACTERIOLOGICAL ANALYSIS OF WATER SUPPLIES WITH THE ABOVE CONDITIONS WILL NOT GIVE A TRUE PICTURE OF WATER QUALITY

LAB ANALYSIS № 244637

☐ POLLUTED ☐ NOT POLLUTED
(SEE REVERSE SIDE FOR INTERPRETATION)

TOTAL COLIFORMS
PER 100 ML

☐ ABOVE RESULTS MAY BE INVALID DUE TO TIME DELAY IN SHIPMENT ADVISE RESAMPLING
(SEE REVERSE SIDE FOR INTERPRETATION)

LAB NO

DATE RECEIVED

EXAMINED BY

DATE REPORTED

LAB COMMENTS

REPORT COPY

Figure 7

1.6.2 Computer Log-in procedure

A. After the samples and their accompanying report forms have been identified and assigned their unique laboratory numbers they are logged in the computer.

1. The computer is programmed for date and current sample number.

2. The collector sample number is entered with its corresponding laboratory number.

3. Also entered at this time are standard analyses codes and the condition of the legal seals as previously noted on the report form.

4. Collectors' specific analyses requests are also entered.

5. Pertinent header information is entered at a later time.

B. Computer then prints the laboratory log-in form for that day. It also prints the necessary work lists for that days samples according to Storet Numbers.

An analytical worksheet should be kept by the technician with a description of the sample, the procedures performed, name of analyst, test results, and any abnormalities that occurred during testing. This should be retained in the laboratory as a permanent record.

After the analyses are completed, any unused portions of the sample along with identifying labels and other documents, must be returned to the custodian or other authorized person and kept in the sample storage area until permission is given to destroy or dispose of the sample.

A sample may be eliminated upon order of the laboratory director in conjunction with the appropriate enforcement officials, or when it is certain that the information is no longer required, or when the sample has deteriorated. These specifications apply to disposal of tags and laboratory records as well. Delivery containers should be returned to their point of origin.

APPENDICES

APPENDIX A
DEPARTMENT OF ENVIRONMENTAL RESOURCES
PUROLATOR COURIER
PICK-UP POINT LOCATIONS

REGION I

CEC Office
520 E. Broad Street
Bethlehem, PA 18000

(JUNE TO SEPT. ONLY)
Bucks County Dept. of Health
410 Bath Road
Bristol, PA 19007

Bucks County Dept. of Health
Neshaminy Manor Center
Doylestown, PA 18901

PA Dept.of Health
Bureau of Laboratories
Pickering Way and
Welsh Pool Road
Lionville, PA 19353

*CEC Office
Ridley Creek State Park
Sycamore Mills Road
Media, PA 19063

DER Regional Office
1875 New Hope Street
Norristown, PA 19401

*PA Dept. of Health
Bureau of Laboratories
Henry A. Landi State Hospital
2100 W. Girard Avenue
Philadelphia, PA 19130

Philadelphia Dept. of Health
(Radiological Health)
500 South Broad Street
Philadelphia, PA 1946

DER District Office
Building No. 10, 1st Floor
Wernersville State Hospital
Wernersville, PA 19565

*Chester County
Department of Health
326 N. Walnut Street
West Chester, PA 19380

*Indicates pick-up point locations that operate on our on-call basis. All others operate on a daily schedule.

DEPARTMENT OF ENVIRONMENTAL RESOURCES
PUROLATOR COURIER
PICK-UP POINT LOCATIONS

REGION II

PennDot Maintenance Bldg. (CEC)
Grove Street & Morgan Highway
Clarks Summit, PA 18411

Forestry Fire Service
Old Airport Road
Hazleton, PA 18201

PennDot Maintenance Bldg. (CEC)
R. D. #4
Indian Orchard, Route 6
Honesdale, PA 18431

CEC Office
108 S. Claude A. Lord Blvd.
Pottsville, PA 17901

CEC Office
Scranton State Office
Building, Room 401
100 Lackawanna Avenue
Scranton, PA 18503

CEC Office
480 Clearview Lane
Stroudsburg, PA 18360

PennDot Maintenance Bldg. (CFC)
One Franklin Avenue
Tunkhannock, PA 18657

DER Regional Office
90 E. Union Street
Wilkes-Barre, PA 18703

DEPARTMENT OF ENVIRONMENTAL RESOURCES
PUROLATOR COURIER
PICK-UP POINT LOCATIONS

REGION III

CEC Office
615 Howard Avenue
Altoona, PA 16601

CEC Office
125 S. Hanover Street
Carlisle, PA 17013

PA Department of Health
425 East North Street
Carlisle, PA 17013

CEC Office
518 Cleveland Avenue
Chambersburg, PA 17201

CEC Office
20 Rocky Mountain Road
Fayetteville, PA 17222

Gettysburg Health Center
103 West Middle Stret
Gettysburg, PA 17325

CEC Office
407 S. Cameron Street
Harrisburg, PA 17120

CEC Office
439 East King Street
Lancaster, PA 17603

CEC Office
130 N. Duke Street
York, PA 17401

Curry Flour Mills
338 N. Railroad Street
Palmyra, PA 17078

Bedford County, Township & Borough
Sanitary Corporation
100 East Pitt Street
Bedford, PA 15522

DEPARTMENT OF ENVIRONMENTAL RESOURCES
PUROLATOR COURIER
PICK-UP POINT LOCATIONS

REGION IV

CEC Office
1121 Old Berwick Road
Bloomsburg, PA 17815

Keystone Market
Clearfield, PA 16830

CEC Office
353 E. Second Street
Coudersport, PA 16915

CEC Office
28 E. Scribner Avenue
DuBois, PA 15801

Mining & Reclamation Office
Water Treatment Plant
Box 208
Hawk Run, PA 16840

Lock Haven State College
Hursh Nevel Building
Fairview & Susquehanna Avenues
Lock Haven, PA 17745

County National Bank
Route 56
Madera, PA 16661

The Camera Shop
311 W. Beaver Avenue
State College, PA 16801

DER Regional Office
200 Pine Street
Williamsport, PA 17701

CEC Office
Two Washington Street
Towanda, PA 18848

CEC Office
Five East Avenue
Wellsboro, PA 16901

CEC Office
247 Pennsylvania Avenue
Sunbury, PA 17801

(Being Negotiated)
Howard, PA 16841

Mining & Reclamation Office
103 Presque Street
Philipsburg, PA

DEPARTMENT OF ENVIRONMENTAL RESOURCES
PUROLATOR COURIER
PICK-UP POINT LOCATIONS

REGION V

Apollo Trust Company
Box 247
Apollo, PA 15613

CEC Office
Municipal Building
2nd Floor
8th Avenue & 15th Street
Beaver Falls, PA 15010

CEC Office
Prave Building
122 S. Center Street
Ebensburg, PA 15931

CEC Office
Armbrust Professional Center
R. D. #2, Box 603-C
Greensburg, PA 15601

PennDot Maintenance
District #10-0
Rt. 286, Box 429
Indiana, PA 15701

CEC Office
203 S. Washington Road
McMurray, PA 15317

DER Regional Office
603 Kossman Building
100 Forbes Avenue
Pittsburgh, PA 15222

CEC Office
487 Hall Street
Rochester, PA 15074

PennDot Maintenance District #9-7
Rt. 219 North, R. D. #2
Somerset, PA 15501

CEC Office
Fayette County Health Center
Room 160
100 New Salem Road
Uniontown, PA 15401

Andy's Market
Route 119
Home, PA 15747

Scheetz Clip Shop
Route 217
Market & Walnut Streets
Blairsville, PA 15717

*CEC Office
195 E. High Street
Waynesburg, PA 15370

Reach Sciotti Motors
Intersection 160 North & 56
P. O. Box 248
Windber, PA 15963

Kittanning State Health Center
354 Vine Street
Kittanning, PA 16201

Mining and Reclamation Office
716 Green Street
Belle Vernon, PA 15012

Bureau of Forestry
District #4
132 W. Main Street
Ligonier, PA 15658

*Indicates pick-up point locations that operate on an on-call basis. All others operate on a daily schedule.

DEPARTMENT OF ENVIRONMENTAL RESOURCES
PUROLATOR COURIER
PICK-UP POINT LOCATIONS

REGION VI

*CEC Office
137 N. Bennett Street
Bradford, PA 16701

*CEC Office
708 Main Street
Clarion, PA 16214

DER Bureau of Laboratories
712 Maryland Avenue
Erie, PA 16505

CEC Office
1st Floor, White Memorial Building
Knox, PA 16232

DER Regional Office
1012 Water Street
Meadville, PA 16335

CEC Office
Central Building
101 S. Mercer Street
New Castle, PA 16101

*CEC Office
Drake Building, Room 329
Seneca Street
Oil City, PA 16301

Bureau of State Parks
Regional Office
Moraine State Park
R. D. #1
Prospect, PA 16052

CEC Office
101 Foundry Street
Punxsutawney, PA 15767

PA Department of Health
Ridgeway State Health Center
St. Mary's Road
Route 120 By-Pass
Ridgeway, PA 15853

CEC Office
900 N. Hermitage Road
Sharon, PA 16146

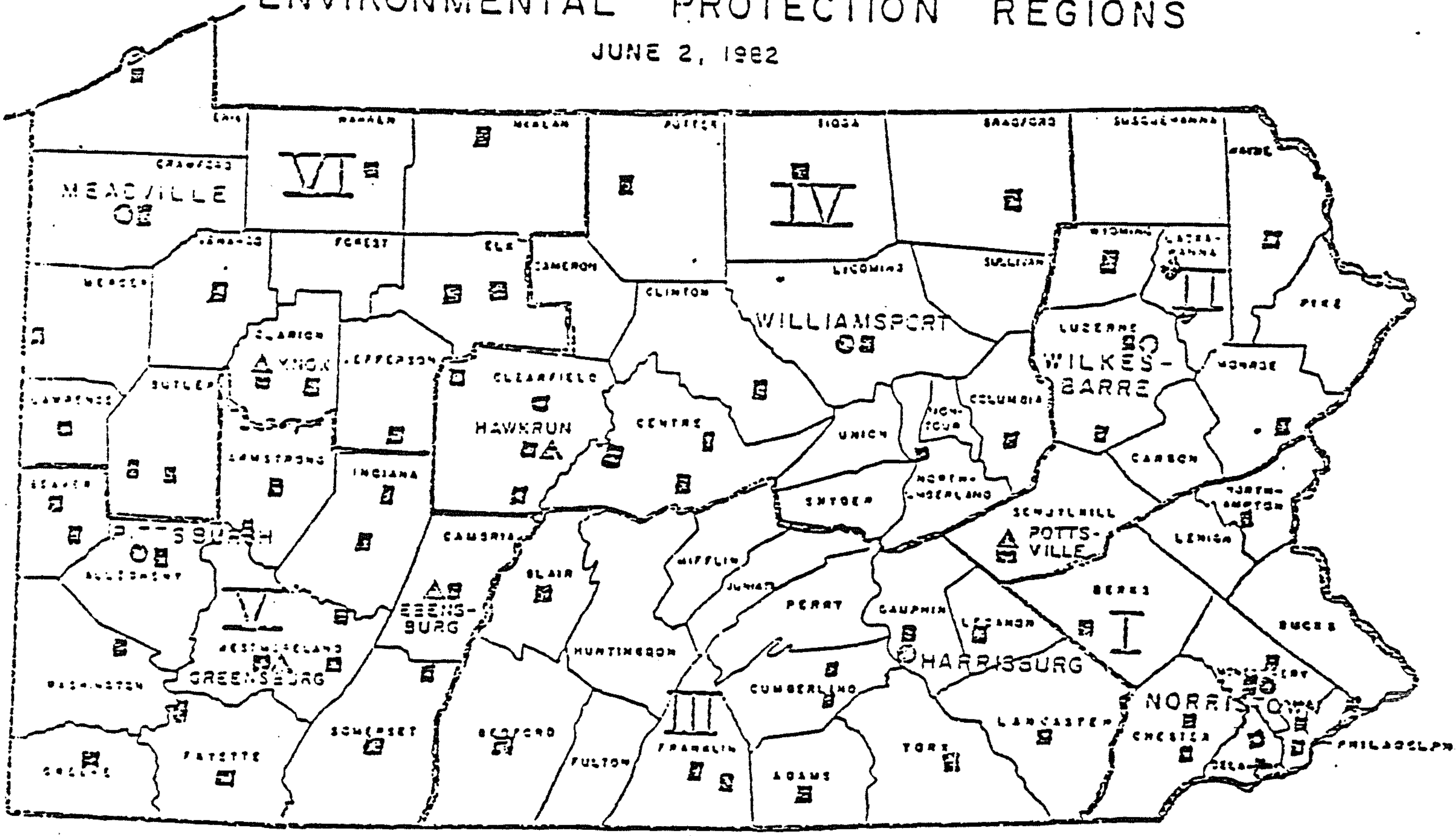
St. Marys Radiator Service
CEC Office
222 E. Mill Street
St. Marys, PA 15857

CEC Office
One North Carver Street
Warren, PA 16365

*Indicates pick-up point locations that operate on an on-call basis. All others operate on a daily schedule.

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES
ENVIRONMENTAL PROTECTION REGIONS

JUNE 2, 1982



⊙ REGIONAL OFFICES △ MINING DISTRICT OFFICES ▣ Puralator Pick-up Poi

BUREAU OF SOLID WASTE MANAGEMENT

FIELD SAMPLING PROCEDURES

TABLE OF CONTENTS

SECTION 1
INTRODUCTION

1.0 Purpose

The purpose of this section is to assure that information generated from samples collected in the fulfillment of the Pennsylvania Solid Waste Management Program will be of known and acceptable quality. This will allow the Bureau of Solid Waste Management to reliably assess the present condition and to aid in determination of the effectiveness of corrective measures. Decisions which are made on the need for abatement activities and on the achievement of acceptable environmental quality must depend on the availability of sound and reliable data.

This goal can be achieved by assuring that proper quality assurance procedures are followed throughout the entire sampling and analysis process.

1.1 Scope

This section will cover quality assurance for ground water, surface water, soil, waste and air samples collected for the Pennsylvania Solid Waste Management program. Quality assurance procedures will be defined for the period of time from collection until the sample is delivered into the custody of the Bureau of Laboratories.

Samples are collected to monitor chemical, bacteriological and radiological quality for activities involving: (a) background samples, (b) permitting activities, (c) compliance activities, (d) spill investigations.

SECTION 2
GENERAL CONSIDERATIONS

2.0 Introduction

In general, sampling requires the collection of adequately sized, representative samples of the waste, water, soil or gases of interest. Sampling situations vary widely and, therefore, no universal sampling procedure can be recommended. Rather, in the later sections, several procedures will be outlined for sampling different types of material in various states using various sampling devices and sample containers.

2.1 General Procedure

The procedures outlined will require a plan to maximize safety of sampling personnel, minimize sampling time and cost, reduce errors in sampling, and protect the integrity of the samples until they are analyzed. The following steps are central in this plan of action:

2.1.1 Research background information about the site and the material to be sampled.

2.1.2 Determine what should be sampled.

2.1.3 Select the proper sampler.

2.1.4 Select the proper sample container and closure.

2.1.5 Design an adequate sampling plan that includes the following: (a) choice of the proper sampling point, (b) determination of the number of samples to be taken, (c) determination of the volumes of samples to be taken.

2.1.6 Observe proper sampling precautions.

2.1.7 Handle samples properly.

2.1.8 Identify samples and protect them from tampering.

2.1.9 Record all sample information in a field notebook.

2.1.10 Fill out the chain of custody record.

2.1.11 Fill out the sample analysis request sheet.

2.1.12 Deliver or ship the samples to the laboratory for analysis.

2.2 Common Sampling Precautions

2.2.1 When choosing sampling equipment, it is important that the sampling tools are chemically compatible with the material to be sampled, so that the sample will not be contaminated by the apparatus, such as metal tools used to sample acid pickling sludges.

2.2.2 Sample containers and their caps must be compatible with the material to be sampled. Very often the sampling container may be appropriate, but the cap's chemical compatibility is completely overlooked.

2.2.3 Decide on a method or procedure for cleaning of sampling tools between samples. One sample may contribute to the contamination of another without a proper cleaning procedure.

2.2.4 Use of proper preservative for samples is often overlooked. Samples taken at point of discharge in most cases are most susceptible to change. (Certain parameters in water require field fixation, i.e., cyanides and phenols. Separate samples must be collected and fixed as soon as possible.)

2.2.5 Label of samples properly. Very often sample containers are labeled using an ink that either may rub off or smear if it gets wet. If possible, tag the outside and drop a tag inside the container when sampling dry solids. Otherwise insure tags and labels are secured tightly to container. See sample label (figure 2.3).

2.2.6 During transport to lab, insure samples are not subjected to extreme temperature changes such as freezing temperatures in the winter or excessive heat in the summer. Sample containers may crack or lose their lids or seals under extreme temperatures.

2.2.7 Use protective clothing when necessary. Very often pathogenic organisms may be present such as in sewage sludge or a toxic substance may be present in a pesticide manufacturing waste. (Treat any waste of unknown or suspected hazard as dangerous. It is a good practice to wear gloves when sampling.)

2.2.8 If low concentrations of a parameter to be tested for are expected, take a large volume of sample (especially true for organics). Conversely, if the material contains high concentrations, a smaller volume will suffice. If in doubt about sample volume, check with the lab.

2.2.9 Using a log book to maintain discreet sample numbers. Record date, time, sample number, facilities sampled and any information that may help interpret resulting data.

2.3 Sample Analysis Request Sheets

2.3.1 Water lab.

(a) Request only analyses that are necessary and have meaning.

(i) When sampling or requesting analyses keep in mind why the sample is being taken. Do not request extraneous analyses.

(ii) If there is a question as to what analyses are appropriate, check with the Operations Supervisor or the Technical Services Section.

(b) Parameters for analyses must be specifically requested unless a standard analysis code exists for the desired analyses.

(i) Use the standard chem sheet "water or waste quality report", ER-BWQ-13, Rev. 9-78 for inorganic analyses. (See figure 2.1)

(ii) Use form ER-BWQ-13.1, Rev. 9-78, "special analyses" for organic analyses. (See figure 2.2)

(iii) Submit separate samples and reports for inorganic and organic analyses even if the same facility or waste stream is being sampled.

(c) Samples should be submitted in standard sample containers with chem sheets clearly identified for each sample.

(i) Fixed samples should be clearly marked on the sample container and on the chem sheet.

(ii) Specially prepared bottles should be used for trace organics. (Consult the lab or the Technical Services Section on which analyses are suitable for each specially prepared container.)

(d) Submit sufficient volume of sample for the analyses requested. It is a good idea to check with the lab concerning the volume of sample required if in doubt.

(i) High concentrations in samples and standards for comparison require relatively smaller volumes.

(ii) Low or trace concentrations require a larger volume of sample.

(e) Most solid samples will require preparation in the soils lab prior to analysis (See sample shipment procedures).

2.3.2 Bacteriology lab.

(a) Separate 100 ml. sterile bottles are required for each analysis.

(b) Use the bacteriological report form to request analyses. One sheet may be used for multiple analyses from the same source.

2.3.3 Soils lab.

Attach completed sample tag to solid samples to be sent to the soils lab. (See figure 2.3)

2.3.4 Reports - Completion of header.

(a) All blocks of report form should be completed except: TYPE TR I. D. Code 4-16, LATITUDE and LONGITUDE 4-18 (unless it is useful, as in a random matrix), KIND 29, USGS-Q 30-34, RELATIVE POINT 58.

(b) Block 2 will be (F) facility (if sample is taken at a permitted facility) or (S) Stream/Random sample (if sample is not from a permitted facility). Network will not be used.

(c) Top header beginning with ESTABLISHMENT should be completed as appropriate to identify the sample. STD ANALYSIS will usually be 50, with desired analyses circled below.

(d) Block 35-37 - SWM.

(e) Block 38 - two numbers go in this block. The first number will always be 2 and indicates the sample as belonging to SWM. The second number will indicate the sample collector's headquarters: 1-Norristown, 2-Wilkes-Barre, 3-Harrisburg, 4-Williamsport, 5-Pittsburgh, 6-Meadville, 9-Central Office.

(f) Blocks 39 and 40 - sample collector's number. A number will be assigned (beginning with 01 and going to 99) to each person in each region/division who might have to sample. If someone resigns, his/her number will become obsolete. A new employee should be given the next highest number in the series.

(g) Blocks 41, 42 and 43 - consecutive sample numbers. This applies to individual collectors.

(h) Blocks 44-57 - may be completed, if applicable.

(i) Block 58 - will not be used.

(j) (Full description water sample taken) should include any additional information that will aid in the analyses and notation of fixed samples, if included. Special preparation of samples such as leaching or acid digestion should be noted here.

2.3.5 Sample Log.

Each collector should keep a personal sampling log to maintain an orderly unique numbering system. Information entered in the log will be for the use of the collector and possible legal reference.

(a) Record sample number - same as in blocks 41-43 on chem sheets.

(b) Record date and time sample was taken.

(c) Record location.

(d) Record any other information that may be significant such as field parameters measured, appearance, etc.

(e) When a sampler has exhausted numbers 001-999, the log should begin at 001 again or the sampler may begin at 001 each year, every two years, etc., as long as some order is consistently maintained and a unique number is associated with each sample.

2.4 Sample Shipment Procedures

Samples should be delivered to the laboratory for analysis as soon as possible after collection. Samples should be transported to the laboratory in a manner that will provide the fastest, most economical and legally supportable mode. All samples should be accompanied by a lab sheet or card that identifies the sample and includes parameters for analysis.

2.4.1 Samples should not be shipped at a time that will cause the time limits for any analysis requested to be exceeded (i.e., samples shipped Friday evening or the day before a holiday will not be analyzed the following day).

2.4.2 Samples should be kept secure at all times to prevent tampering and to establish a legally defensible chain of custody (i.e., samples left unattended in a vehicle should be secured by locking the vehicle).

2.4.3 Hand carried samples should be delivered to the laboratory by 8:00 a.m. the day following collection to assure logging in and analysis within the time limits specified for analysis.

(a) Samples delivered late in the day of collection will be held in refrigeration for analysis the following day.

(b) Hand delivery is the best means to establish chain of custody. (For optimum chain of possession, notify the shipping and receiving section or some other laboratory personnel of the delivery.)

2.4.4 Solid and semi-solid samples that require inorganic analyses, special preparation, or leaching must be shipped to the soils lab in Harrisburg. (Metals analyses and bacteriological analyses may be shipped to the Erie lab upon approval of the Director of this lab.)

2.4.5 Leachate and monitoring well samples may be sent directly to the chemistry or bacteriological labs (Harrisburg or Erie).

2.4.6 Organic analyses should be sent to the Harrisburg chemistry lab.

2.4.7 Purolator shipments - samples requiring shipment from a remote location or field office should be sent by Purolator. Some samples may require packaging in accordance with DOT regulation if they are flammable, corrosive, etc. Contact the Purolator Terminal in the area or the Technical Services Section if there is any question. Figure 2.4 is an example of a bill of lading to be completed for each shipment.

2.5 Laboratory Services

The Bureau of Laboratories is available for technical support to field personnel in the form of analyses, sample containers and limited consultation. Sampling and analyses requests should be conducted with consideration of the capabilities of the laboratory.

2.5.1 Special surveys must be cleared with the lab or the Technical Services Section prior to being conducted.

(a) Greater numbers of samples than usual during this survey should be balanced by limiting sampling in connection with other phases of the region's programs.

(b) The lab should be notified of the number of samples, analyses and date they will be submitted.

2.5.2 Supply as much information as possible to speed the processing and analysis of the samples. If any assay is expected to be high, or if a high concentration of a hazardous material is present, indicate this on the chem sheet and on the container. Be as specific as possible.

2.6 Training

Personnel involved in any function affecting data quality shall have sufficient training in their tasks so as to contribute to the overall quality of the data.

Training will be available to Bureau employees to accomplish this goal. Training will be provided from the following sources.

2.6.1 The Bureau of Laboratories will continue their efforts to train field staff in proper sample collection, handling and preservation procedures.

2.6.2 The Bureau's operations supervisors will oversee the training of new field employees insuring that they are instructed in proper sampling techniques by experienced personnel.

The operations supervisors will also accompany the solid waste specialists on inspection and sampling activities as described in Section 2.7 on internal QC checks.

2.6.3 The Bureau will attempt to send its staff to any EPA sponsored training course which will provide knowledge and skills to assist in the improvement of its quality control.

2.7 Internal QC Checks

An ongoing program of quality control checks will provide a means of assessing the performance of this plan. This will be accomplished in the following ways.

2.7.1 System Audit - The operations supervisor in each region shall accompany each solid waste specialist in his region into the field on a quarterly basis. In the course of this day, the supervisor will observe the sampling techniques employed by the solid waste specialist. Sampling techniques which are inconsistent with the methods outlined in this document will be brought to the attention of the solid waste specialist for correction. Joint follow-up field inspections will be scheduled by the operations supervisor as needed.

2.7.2 Performance Audit - One sample in twenty-five will be a split sample. The solid waste specialist shall submit one of the splits under the correct facility name with an explanation of conditions and description of sampling, as usual. The second split shall have identical conditions and description of sampling, but shall use a fictitious facility name and location. The sample collector shall properly identify each split in the field log. Sample results shall be compared when received and copies forwarded to the Bureau's QA Officer.

2.8 Preventive Maintenance

The attached major equipment list for the Bureau lists the routine maintenance required for this equipment.

As of 6/1/83

MAJOR EQUIPMENT LIST
BSWM

	Item	Quantity	Location	Maintenance
1.	Alidade, Gurley	1	C	-
2.	Altimeter, Surveying, Terra	1	R_1	-
3.	Analyzer, Organic Vapor, Foxboro	1	R_2	Cal, Br
4.	Analyzer, Oxygen, Fyrite	2	T	-
5.	Analyzer, Oxygen, MSA	6	AR	Bn
6.	Analyzer, Photoionization-HNU	7	AR,C	Br
7.	Anemometer, Natural Power (1), Climatronics (1)	2	T,C	-
8.	Binocular, 7 x 35 Binolux	24	AR,C	-
9.	Calculator TI55	26	AR,C	Br
10.	Camera 35mm Canon AF-Rangefinder	19	AR	Bn
11.	Camera 35mm Pentax SLR	1	C	Bn
12.	Camera Movie-Kodak XL330	1	C	-
13.	Camera, Polaroid 450	1	C	Bn
14.	Camera, Polaroid One Step	15	AR	Bn
15.	Compressor, Air, Sears 1 HP	1	T	-
16.	Drill Electric 3/4 inch	1	T	-
17.	Generator, Mobile 7500 Watt Onan	1	T	Br
18.	Generator, Portable 2250 Watt	7	AR,E	-
19.	Kit, Hazardous Materials, Hach	1	T	Bn
20.	Kit, Toxic Gas Detection, Kitigawa	8	AR,T	-
21.	Kroyetting Machine	1	C	-
22.	Level Abney	7	AR	-
23.	Lights, Flood - 500 Watt QI	3	T	-
24.	Magnetic Locator, Schoenstadt	8	AR,T,E	Bn
25.	Megaphone, Power	1	T	Bn
26.	Meter, Combustible Gas/Oxygen-MSA260	5	$R_{1,2,5,3}$C	Bn,Cal,X
27.	Meter, Explosi-MSA Model 2A	14	AR,C	Bn,Cal
28.	Meter, Groundwater Flow-KV Model 30	1	C	Br,Cal
29.	Meter pH, Leads & Northrup	8	AR	Cal
30.	Meter pH, Digisense	7	AR,T	Bn,Cal
31.	Meter, Radiation Survey	1	C	Bn,Cal

As of 6/1/83

32.	Meter, Specific Conductance YSI	15	AR,C,T	Bn,Cal
33.	Microscope, Stereo, Fisher Scientific	1	T	-
34.	Nuclear Moisture Density Set	1	C	Br,Cal
35.	Oxygen Administrator	1	T	-
36.	Plane Table, Gurley	1	C	-
37.	Projector, Slide, Kodak 475	1	C	-
38.	Projector, Slide, Kodak 800	1	C	-
39.	Projector, Overhead	7	AR,C	-
40.	Pump, Ground Water Sampling Fultz 2 1/2"	11	AR,C	X
41.	Pump, Ground Water Sampling Fultz 1 3/4"	3	AR,C	X
42.	Pump, Impinger, Samping, MSA	2	AR,C	Br
43.	Pump, Submersible, 1/2 Hp, Standard	8	AR,C	-
44.	Pump, Sump	1	T	-
45.	Radio, CB	1	T	-
46.	Radio, Motorola Mobile	1	T	-
47.	Radio, Portable w/charges, Motorola	4	T	Br
48.	Radio, Headset, Unicom	4	T	Bn
49.	Reader, Microfiche, 3M	1	C	-
50.	Recorder, Anemometer, Rustrak	2	T,C	Br
51.	Recorder, Cassette-Dictaphone	8	AR,C	Bn
52.	Recorder, Micro-Lanier	19	AR,C	Bn
53.	Recorder, OVA, Rustrak	1	C	Bn
54.	Recorder, Temperature, Rustrak	2	T	-
55.	Refrigerator	2	T,C	-
56.	Resistivity Survey Unit, Soil Test	1	C	Br
57.	Sampler, Johnson	1	R_1	-
58.	Sampler, Kemmerer	8	AR,T	-
59.	Seismic Survey Unit, Bison	1	C	Br
60.	SCBA, Aerorlox	4	T	-X
61.	SCBA, MSA 401	22	AR,T	-X
62.	Suit "Moon"-Dover	6	T	-
63.	Synthesizer, Wollensak M2573	1	C	-
64.	Temperature Senso., Natural Power	2	T	-
65.	Transit, Lietz	6	AR	-
66.	Transit-Level	7	AR	-
67.	Vest, Cool-Dover	4	T	Br

As of 6/1/83

AR -	All Regions
Rx -	Region and Number
T -	Response Trailer
C -	Central Office
E -	Evan Press Bldg.
Bn -	Battery, Nonrechargable
Br -	Battery, Rechargable
Cal -	Calibration
X -	Special Maintenance Requirement

Figure 2.1

ER-BWQ-13
REV 9-78

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT

WATER OR WASTE QUALITY REPORT

ALL CHEMICAL ANALYSES EXPRESSED IN MG/L UNLESS OTHERWISE SPECIFIED

LAB. Number ______

Date Received ______

W 1 FACILITY SAMPLE
2 STREAM/RANDOM SAMPLE
· NETWORK SAMPLE

ESTABLISHMENT	CASE	FACILITY	COLL NUMBER

COUNTY	MUNICIPALITY	PROGRAM	COLL NAME	TYPE TR	STD ANALYSIS

CARD (3) 1 / 2	ID CODE (ALL CARDS) 4-16: Cnty, Mun, T, Est, Case, Fac	LATITUDE 4-10	LONGITUDE 11-18	DATE 19-24: M, D, Y	TIME 25-28: Hr, Min	KIND 29

USGS-D 30-34	AGENCY 35-37	SAMPLE NUMBER 38-43	STREAM NAME 44-57	RELATIVE POINT 58

TRIBUTARY TO: | ADDITIONAL LAB ANALYSES

FULL DESCRIPTION WHERE SAMPLE TAKEN

FIELD ANALYSES

Type Sample		59-60	
Source of Sample		61-62	
Reason Sampled		63-64	
Composite Sample	Proportional / Uniform	65	
	Temporal / Spatial	66	
	Aliquots	67-68	
Flow	Estimated / Measured	69	
Condition	Above - 1, Normal - 2, Flood - 5, Below - 3, No Flow - 4	80	CARD (2)
Stream Flow-CFS		(00061)	
Stream Flow-MGD		(50051)	
Pipe Flow-MGD		(50050)	
Gage Reading-Ft.		(00065)	
Temp (C)		(00010)	
pH		(00400)	
D.O.		(00300)	
Hal	Cl (50060) / Br (71871) / I (71868)		
Spec Cond		(00094)	
Appearance		(46001)	
Odor		(01330)	

CUSTODY LOG

How Shipped ______ Date ______
Legal Seal No. ______
Received by ______
Condition of Seal ______

LAB ANALYSES

Chemist ______ Date Analyzed ______ / /

Color	(00080)	Total Solids	(00500)
Turb	(00070)	Susp. Solids	(00530)
pH	(00403)	Set Solids	(00545)
Spec. Cond	(00095)	Total Diss Solids	(00515)
Alk	(00410)	NO_2-N	(00615)
pH4	(00436)	NO_3-N	(00620)
pH8 Hot / Cold	(00437) / (00435)	NH_3-N	(00610)
T.O.C.	(00680)	Kjel-N	(00625)
C.O.D.	(00340)	Hardness	(00900)
5-Day BOD	(00310)	Ca^{++} - diss	(00915)
P T / TD	(00665) / (00666)	Mg^{++} - diss	(00925)
Al-Tot ug/l	(01105)	SO_4	(00945)
Cd-Tot ug/l	(01027)	Cl	(00940)
Cr-Tot ug/l	(01034)	F	(00951)
Cu-Tot ug/l	(01042)	MBAS	(32260)
Fe-Tot ug/l	(01045)	Phenols ug/l Or / Os	(46002) / (32730)
Mn-Tot ug/l	(01055)	Cyanide	(00720)
Ni-Tot ug/l	(01067)	______	(______)
Pb-Tot ug/l	(01051)	______	(______)
Zn-Tot ug/l	(01092)	______	(______)

Figure 2.2

ER-BWQ-13.1
REV 9-78

W | FACILITY SAMPLE
STREAM/RANDOM SAMPLE
1 2 NETWORK SAMPLE

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT
WATER OR WASTE QUALITY REPORT — SPECIAL ANALYSES

Lab Number
Date Received

ESTABLISHMENT	CASE	FACILITY	COLL NUMBER

COUNTY	MUNICIPALITY	PROGRAM	COLL NAME	TYPE TR	STD ANALYSIS

CARD 1-3	ID CODE (ALL CARDS) 4-16	LATITUDE 4-10	LONGITUDE 11-18	DATE 19-24	TIME 25-28	KIND 29
1 / 2	Cnty · Mun · T · Est · Case · Fac			M · D · Y	Hr · Min	

USGS Q 30-34	AGENCY 35-37	SAMPLE NUMBER 38-43	STREAM NAME 44-57	RELATIVE POINT 58

TRIBUTARY TO:
FULL DESCRIPTION WHERE SAMPLE TAKEN

ADDITIONAL LAB ANALYSES

CUSTODY LOG

How Shipped Date
Legal Seal No.
Received by:
Legal Seal Condition:

QUALITATIVE REPORT

QUANTITATIVE RESULTS

ANALYSIS:	UNITS:	ANALYSIS CODE	RESULTS (SHOW DECIMAL POINTS ON LINES)

ANALYST ______________________ DATE ______________
SIGNATURE

Figure 2.3

SAMPLE # ____________________ DATE __________

COLLECTOR ____________________ TIME __________

LOCATION ____________________________________

COUNTY ________________ MUN. ________________

ANALYSIS ____________________________________

COMMENTS ____________________________________

Figure 2.4

ORIGINAL COPY

27089025 Purolator courier PUROLATOR COURIER CORP

UNIFORM STRAIGHT BILL OF LADING
ORIGINAL NOT NEGOTIABLE

DATE	SHIPPER	CHECK IF HIWAY PAK

It is mutually agreed that goods herein described are accepted in apparent good order (except as noted) for transportation as specified herein.
Common carriage: Shipments subject to rules, classifications and tariffs, in effect as of the date hereof, which are filed in accordance with law, copies of which are available for inspection, are hereby incorporated into and made part of this contract.
Contract carriage: Shipments subject to applicable contract between shipper and carrier in effect as of the date hereof. Absent contract, liability limited to $250.

Unless a greater value is declared hereon, the shipper hereby agrees and declares that the value of the property described herein is released to a value not exceeding $250 per shipment

DECLARED VALUE

CONSIGNEE NAME AND ADDRESS	COMMODITY	BAGS	ENVS	BOXES	OTHER	WEIGHT	

WAITING TIME HRS MIN.	WAITING CHARGES	SPECIAL CHARGES	TOTAL PIECES	TOTAL CHARGES

SHIPPER SIGNATURE	COURIER SIGNATURE	ROUTE NO	CONSIGNEE SIGNATURE

DATE	TIME AM PM	DATE	TIME AM PM	DATE	TIME AM PM

PRESS HARD - THIS IS A 5 PT. FORM

SECTION 3
WASTE MATERIALS

3.0 Introduction

The technique of sampling waste material should be conducted in such a way that the sample represents the entire waste. This can be thought of as condensing the entire mass into a representative mass of a very small volume suitable for handling and testing.

3.1 Background Information About the Waste

Accurate background information about the waste to be sampled is very important in planning any sampling activity. The information is used to determine the types of protective sampling equipment to be used, sampling precautions to be observed, as well as the types of samplers, sample containers, sample closures, and preservatives (when needed) required. Generally, the information about the waste determines the kind of sampling scheme to be used.

Most often, the information about the waste is incomplete. In these instances, as much information as possible must be obtained by examining any documentation pertaining to the waste, such as haulers manifest for hazardous waste. When documentation is not available, information may be obtained from the generator, hauler, disposer, or processor. The information obtained is checked for hazardous properties against references such as the Dangerous Properties of Industrial Materials, the Merck Index, the Condensed Chemical Dictionary, Toxic and Hazardous Industrial Chemicals Safety Manual for Handling and Disposal with Toxicity and Hazardous Data, or other chemical references.

3.1.1 Site parameters influencing sampling. There are essentially five site conditions which will influence the methods and techniques used for waste sampling; the type of site, the site size, the topography present, stratification of waste and ponding vs unponded conditions.

Waste materials will be disposed of in drums, bails, bins, sacks, trucks, lagoons and landfills. A lagoon is a structure with impermeable sides and bottom in which sludges and slurries are disposed of. Normally they cannot be crossed on foot because of either ponded water or because materials are too soft and wet.

The size of the site will influence the number of samples taken and the sampling methodology chosen. Sites often cover hundreds of acres and the wastes disposed of are often variable over a wide range. Therefore, obtaining a representative sample becomes increasingly more difficult as the size of the site increases.

The sampling equipment and a number of samples may also be influenced by the topography. Disposal sites have been found in almost every type of terrain from valley bottoms and swamps to hills and mountaintops. The topography will govern the sites accessibility and in turn the sampling equipment and methodology.

The waste stream from an industrial process will vary according the quality controls on the process and these manufacturing variabilities in a waste stream may create stratifications of the waste at the disposal site. For instance, a sludge flowing into a lagoon will vary from day to day depending on the problems with the industrial process and/or the possibility that other waste streams are also flowing into the lagoon. This may cause stratifications in the lagoon and these will appear as streaks of different colors or textures running through the lagoon. The sampling will have to be altered to best represent this circumstance.

Another common occurrence on disposal sites is the presence of ponded liquids due either to poor site management of surface water and/or ground water, or the lagooning of sludges and slurries. Obtaining a sample under these conditions may require special equipment and techniques.

3.2 Selection of Sampler

Hazardous waste are usually complex, multiphase mixtures of liquids, semisolids, sludges, or solids. The liquid and semisolid mixtures vary greatly in viscosity, corrosivity, volatility, explosivity and flammability. The solid waste can range from powders to granules to big lumps. The wastes are contained in drums, barrels, sacks, bins, vacuum trucks, ponds and other containers. No single type of sampler can therefore be used to collect representative samples of all types of waste. Table 3.1 lists recommended samplers and their inherent limitations. Also included is the EPA listing of recommended equipment for particular waste types (Table 3.1a).

3.3 Cleaning of Samplers

All samplers must be clean before use. Used samplers must be washed with warm detergent solution (i.e., Sparkleen), rinsed several times with tap water, rinsed with distilled water, drained of excess water and air dried or dried with a stream of warm dry air or wiped dry. For samplers that have been used to sample petroleum products and oil residues, it may be necessary first to wipe the samplers with absorbent cloth to eliminate the residues. The equipment is then rinsed with an organic solvent such as petroleum naptha or trichloroethane, followed by washing with the detergent solution and rinsing with water. A necessary piece of eqiupment for cleaning a tube sampler is a bottle brush that fits tightly the inside diameter of the tube. The brush is connected to a rod of sufficient length to allow for reaching the entire length of the sample tube. Using this ramrod and fiber reinforced paper towels, the tube may be quickly cleaned. The cleaning of the equipment is very important to prevent cross-contamination. Any questions on proper cleaning should be referred to the Division's chemists or the Bureau of Labs.

Improper cleaning of sampling equipment will cause cross-contamination of samples. Such contamination is of particular importance in samples taken for legal or regulatory purposes. Also, contamination becomes important when sampling wastes from different production sources within the same time frame. A detailed study of cross-contamination as a function of cleaning procedures has not been carried out. A recommended policy is that if samples are to be taken for legal or regulatory purposes, or if analysis is to be performed on samples expected to contain low level concentrations of hazardous components, that a fresh unused sampler be used. To accomplish this, the investigator will have to know beforehand what is being sampled and how many samples will be taken so that he or she may either have cleaned or ordered enough samplers to complete the sampling program. The use of disposable samplers is very useful in these cases. It is equally important that the samplers be protected from contamination prior to use by wrapping, packaging or containerization in clean uncontaminated materials.

If the cleaning process has the potential for producing toxic fumes, insure adequate ventilation. If the washings are hazardous, store them in closed waste containers and dispose of them properly in approved disposal sites. Store the clean samplers in a clean and protected area. Polyethylene plastic tubes or bags are usually adequate for storing samplers.

Table 3.1. Recommended Samplers

Recommended Sampler	**Limitations**
Tube	Not for containers 1.5 m (5 ft.) deep
a. Plastic	Not for wastes containing ketones, nitrobenzene, dimethylformamide, mesityl oxide, or tetrahydrofuran
b. Glass	Not for wastes containing hydrofluoric acid and concentrated alkali solutions
c. Stainless Steel	Not for strong acids and bases
Pole (pole with sample bottle attached)	Cannot be used to collect samples beyond pole length
Grain Sampler	Limited application for sampling moist and sticky solids with a diameter of 0.6 m (1.4 in.)
Sampling Trier	May incur difficulty in retaining core sample of very dry granular materials during sampling
Trowel or Scoop	Not applicable to sampling deeper than 8 cm (3 in.). Difficult to obtain reproducible mass of samples.
Shovel	Applicable to sampling less than 1 m (39.37 in.) deep. Difficult to obtain reproducible mass of samples
Waste Pile Sampler	Not applicable to sampling solid wastes with dimensions greater than half the diameter of the sampling tube
Soil Auger	Does not collect undisturbed core samples
Weighted Bottle Sampler	May be difficult to use on very viscous liquids

Table 3.1a

SAMPLING EQUIPMENT FOR PARTICULAR WASTE TYPES

	Waste location or container								
Waste type	Drum	Sacks and bags	Open bed truck	Closed bed truck	Storage tanks or bins	Waste files	Ponds, lagoons, & pits	Conveyor belt	Pipe
Free flowing liquids and slurries	Coliwasa	N/A	N/A	Coliwasa	Weighted bottle	N/A	Dipper	N/A	Dipper
Sludges	Trier	N/A	Trier	Trier	Trier	a	a		
Moist powders or granules	Trier	Trier	Trier	Trier	Trier	Trier	Trier	Shovel	Dipper
Dry powders or granules	Thief	Thief	Thief	Thief	Thief	Thief	Thief	Shovel	Dipper
Sand or packed powders and granules	Auger	Auger	Auger	Auger	a	a	a	Dipper	Dipper
Large grained solids	Large Trier	Large Trier	Large Trier	Large Trier	Large Trier	Large Trier	Large Trier	Trier	Dipper

[a]This type of sampling situation can present significant logistical sampling problems, therefore sampling equipment must be specifically selected or designed based on site and waste conditions. No general statement about appropriate sampling equipment can be made.

3.4 **Selection of Sampler Containers, Container Closure and Closure Lining**

The most important factors to consider when choosing containers for waste samples are compatibility, resistance to breakage and volume. Containers must not melt, rupture or leak as a result of chemical reactions with constituents of waste samples. Thus, it is important to have some idea of the components of the waste. The containers must have adequate wall thickness to withstand handling during sample collection and transport to the laboratory. Containers with wide mouths are desirable to facilitate transfer of samples from samplers to containers. Also, the container must be large enough to contain the required volume of sample or the entire volume of the sample contained in samplers. Just as sampling tools are protected from contamination, so too must the container be protected by wrapping, packaging or containerization.

Plastic and glass containers are generally used for collection and storage of hazardous waste samples. The plastic containers available through the Bureau of Labs are made of high density or linear polyethylene (LPE) (500 ml.) and polypropylene (145 ml.). Teflon FEP is the most inert plastic but LPE offers the best combination of chemical resistance and low cost.

Glass containers are relatively inert to most chemicals and can be used to collect and store almost all hazardous waste samples except those that contain strong alkali and hydrofluoric acid. Glass containers are breakable and much heavier than plastic containers. Volatile organic analyses (VOA) bottles with Teflon caps are available from the Bureau of Labs for sampling light molecular weight organics.

Glass french squares (500 ml.) or half gallon bottles should be used for waste samples containing petroleum distillates, chlorinated hydrocarbons, pesticides and petroleum residues that are mostly incompatible with plastic containers. For all other types of samples, 500 ml wide-mouth LPE bottles are recommended.

The containers must have tight, screw type lids. Plastic bottles are usually provided with screw caps made of the same material as the bottles. No cap liners are usually required. Glass containers usually come with glass or rigid plastic screw caps such as Bakelite. The plastic caps are popularly provided with waxed paper liners. Other liner materials are polyethylene, polypropylene, neoprene and Teflon FEP plastics. Bakelite caps with Teflon liners are recommended for use with glass bottles. Teflon liners may be obtained from the Bureau of Labs through the Solid Waste Technical Services Section. For sampling organics where only plastic caps are available, cover the mouth of the bottle with aluminum foil and then screw the cap on carefully.

Table 3.2 shows most types of wastes and the corresponding sampling containers and closures recommended.

3.5 **Sample Types**

There are two types of samples that may be taken, nonbatch and batch. The two categories may be broken down into simple random samples, stratified samples and time samples.

The nonbatch are single samples taken at specified points. The simple random sample is a sample taken from one particular point. The stratified nonbatch samples are samples taken from points that represent differences in the waste. A lagoon, for instance, may have distinctly different layers and it is desired to obtain a sample from each.

A batch sample is a composite of subsamples. The subsample may be taken from a single horizon which is classified as a simple random batch sample, or the sample may be composed of subsamples taken from different horizons or stratifications.

Samples may also be collected at the point of discharge at random or at specified time intervals using batch or nonbatch techniques. Samples taken at the point of discharge will produce the most reliable representations of the leachability of the waste.

3.6 Sampling Plans

A sampling plan or scheme must be formulated prior to sampling. The sampling plan must locate sampling points so that suitable random, representative samples can be obtained. There are a number of different sampling plans that can be used. Basically, these plans are either based on judgement, simple random choice, or a choice made using some other devised scheme.

A judgement sample is made when the sampler decides where a representative sample can be taken simply through visual observation. A random sample is one taken at a point that was arbitrarily chosen or chosen as part of a random scheme.

For landfills, piles and sludge, different methods are available such as the one step or two step procedure. These are simple procedures which make use of one or two dimensional coordinate systems, and the samples are taken at random distances from the origin. Systematic sampling plans are also used whereby samples are taken at regular intervals away from one another such as intersections of lines on a grid system. Depending on the number of grid points and how it is superimposed on a map of the site, the number of sampling points will vary. Wastes stored in drums, tanks and bails can be sampled using tables of random numbers by assigning consecutive numbers to the containers, and picking the numbers randomly from the tables. See appendix A.

The number of samples to be taken depends primarily on the information desired. Table 3.3 lists the recommended number of samples to be collected consistent with the information sought and the types of wastes to be sampled. In hazardous waste management, the properties and the average concentrations of a hazardous component are usually desired. In this respect, collecting one representative sample of a given waste is usually adequate.

When gathering evidence for possible legal actions, multiple samples of a waste are usually collected. Three identical samples are desirable; one sample is to be given to the company or organization responsible for the waste, the second sample is to be submitted to the laboratory for analysis, and the third sample is kept in storage for possible use as a referee sample. Subdividing a waste sample is not recommended unless it is homogeneous.

See Section 1, Sampling of Solid Wastes, from the EPA publication "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846, 2nd edition) for a discussion on development of appropriate sampling plans including fundamental statistical concepts and basic sampling strategies.

3.7 Volume of Samples

Sufficient volume of a sample, representative of the main body of the waste, must be collected. This sample must be adequate in size for all needs, including laboratory analysis, splitting with other organizations involved, etc. In collecting liquid waste samples in drums, vacuum trucks or similar containers, the volume collected in the tube sampler usually determines the volume of the sample. This volume can range from 200 to 1800 ml. (1/2 pint to 1.9 quart). In most cases, 1,000 ml. (two 500 ml. bottles) of a sample is sufficient. Hazardous wastes usually contain high concentrations of the hazardous components, and only a small aliquot of the sample is used for analyses. Trace organics in water require at least a half gallon in a specially prepared bottle.

3.8 Sampling Precautions and Protective Gear

Proper safety precautions must always be observed when sampling hazardous waste. In all cases, a person collecting a sample must be aware that the waste can be a strong sensitizer and can be corrosive, flammable, explosive, toxic and capable of releasing extremely poisonous gasses. The background information obtained about the waste should be helpful in deciding the extent of sampling safety precautions to be observed, and choosing protective equipment to be used.

For full protection, the person collecting the sample must use a self contained breathing apparatus, protective clothing, hardhat, neoprene rubber gloves, goggles, and rubber boots.

A self-contained breathing apparatus consists of an airtight face mask and a supply of air in a pressure tank equipped with a pressure regulator. Protective clothing consists of long sleeved neoprene overcoat and pants, or long sleeved coverall and oil and acid proof apron. In hot weather, the coverall apron combination might be preferred. All equipment except the respirator must be properly washed and cleaned between uses.

The self-contained breathing apparatus will not be required in all sampling situations. In some cases, gas masks or chemical cartridge type respirators with filters will suffice. Sampling of wastes where respiratory protection is required must be done only by persons who have taken the EPA sponsored training course called "Personnel Protection and Safety", No. 165.2. Consult the training manual from this course for information in selecting the proper respiratory protection equipment.

For added protecton in sampling, a second person with a radio telephone and first aid kit must be present to render any necessary help or call for assistance.

3.9 Sampling Procedures

The following procedures are recommended for sampling in different types of wastes in various containers. The draft ASTM methods for sampling lagoons and point discharges (pipes and conveyor belts) are included as Appendix B for your use as information only. Additional ASTM methods will be added to this appendix as they become available.

3.9.1 Sampling a drum.

Do not open closed drums. Have the site operator open it; or, if no operator can be found, mark the location and leave it alone.

Drums containing liquid wastes can be under pressure or vacuum. A bulging drum usually indicates that it is under high pressure and should not be sampled until the pressure can be safely relieved. A heavily corroded or rusted drum can readily rupture and spill its content when disturbed; it should only be sampled with extreme caution. Opening the bung of a drum can produce a spark that might detonate an explosive gas mixture in the drum. This situation is difficult to predict and must be taken into consideration every time a drum is opened. The need for full protective sampling equipment cannot be overemphasized when sampling a drum.

(a) Position the drum so that the bung is up. Drums with the bung on the end should be positioned upright; drums with bungs on the side should be laid on the side with the bungs up. Have site operator do this.

(b) Allow the contents of the drum to settle.

(c) Slowly loosen the bung with the bung wrench, allowing any gas pressure to release. Have site operator do this.

(d) Remove the bung and collect a sample through the bung hole with a tube sampler.

(e) When there is more than one drum of waste at a site, segregate and sample the drums according to waste types using a table of random numbers.

3.9.2 <u>Sampling a vacuum truck.</u>

Wear full protective sampling gear. Preferably, two persons should perform the sampling. One person should do the actual sampling and the other should stand ready with a sample container and help deal with any problems. A sample collector should position himself to collect samples only after the truck driver has opened the tank hatch. The tank is usually under pressure or vacuum. The driver should open the hatch slowly to release pressure or to break the vacuum.

(a) Let the truck driver open the tank hatch before climbing onto the truck.

(b) Using protective sampling gear, assume a stable stance on the tank catwalk or access rung to the hatch.

(c) Collect a sample through the hatch opening with a sampling tube.

(d) If the tank truck is not horizontal, take one additional sample each from the rear and front cleaned out hatches and combine all three samples in one sample container.

(e) When necessary, carefully take a sediment sample from the tank through the drain spigot.

3.9.3 <u>Sampling a barrel, fiberdrum, can, bag, or sack containing powder or granular waste.</u>

The proper protective respirator in addition to other protective gear must be worn when sampling dry powdered or granular waste in these containers. Have the site operator open these containers, or leave it alone. These wastes tend to generate airborne particles when the containers are disturbed. Containers must be opened slowly. The barrels, fiberdrums and cans must be positioned upright. If possible, sample sacks or bags in the position you find them since standing them upright might rupture the bags or sacks.

(a) Collect a composite sample from the container with a grain sampler or sampling trier.

(b) When there is more than one container of waste at a site, segregate and sample the containers according to a table of random numbers.

3.9.4 Samping a pond.

Storage or evaporation ponds for wastes vary greatly in size from a few to several hundred square meters. It is difficult to collect representative samples from the large ponds without incurring large expenses and assuming excessive risks. Any samples desired beyond 3.5 meters (11 1/2 feet) from the bank may require the use of a boat which is highly risky, or the use of a crane or helicopter which is very expensive. The information sought must be weighed against the risk and expense of collecting the samples. The pole sampler can be used to collect samples as far as 3.5 meters (11 1/2 feet) from the bank.

Collect a composite sampler with a pole sampler.

3.9.5 Sampling a waste pile.

Waste piles can range from small heaps to large aggregates of waste. The wastes are predominantly solid and can be a mixture of powders, granules and chunks as large or greater than 2.54 centimeters (1 inch) average diameter. A number of core samples have to be taken at different angles and composited to obtain a sample that, on analysis, will give average values for the components in the waste pile.

(a) Determine the sampling points.

(b) Collect a composite sample with a waste pile sampler.

3.9.6 Sampling a storage tank.

The collection of liquid samples in storage tanks is discussed in the ASTM methods. The procedure used here is adopted from one of those methods.*

Sampling a storage tank requires a great deal of manual dexterity. Usually it requires climbing to the top of the tank through a narrow vertical or spiral stairway while wearing protective sampling devices and carrying sampling equipment. At least two persons must always perform the sampling. One should collect the actual samples and the other should stand back, usually at the head of the stairway, and observe, ready to assist or to call for help. The sample collectors must be accompanied by a representative of the company who must open the sampling hole, usually located on the tank roof.

(a) Collect one sample each from the upper, middle and lower section of the tank contents with a weighted bottle sampler.

(b) Combine these samples into one container and submit it as a composite sample.

Never enter a storage tank to sample.

*ASTM methods: D1265-"Sampling Liquified Petroleum (LP gases)"; D1570-"Sampling and Chemical Analysis of Fatty Alkyl Sulfates; E122-"Choice of Sample Size to Estimate the Average Quantity of a Lot or Process".

3.10 Sample Handling

After a sample is transferred into the proper sample container, the contaner must be tightly capped as quickly as possible to prevent the loss of volatile components and to minimize possible oxidation from exposure to the atmosphere.

3.11 Preservation and Storage of Samples

Ideally, waste samples should be analyzed immediately after collection for maximum reliability of the analytical results. Wastes (especially hazardous wastes) can be such complex mixtures that it is difficult to exactly predict the physical, biological and chemical change that may occur in the samples with time. After collection of samples, pH may change significantly in a matter of minutes; sulfides and cyanides may be oxidized or evolve as gases; and hexavalent chromium may slowly be reduced to the trivalent state. Certain cations may be partly lost as a result of adsorption to the walls of the sample containers. Growth of microorganisms may also cause changes to certain constituents of the sample. Volatile components may be rapidly lost.

Refrigeration may deter the evolution of volatile components and acid gases such as hydrogen sulfides and hydrogen cyanides, but it also introduces the uncertainty that some salts may precipitate at lower temperature. On warming to room temperature for analysis, the precipitates may not redissolve, thus incurring error in determining the actual concentrations of the dissolved sample constituents. Addition of preservatives may retard biochemical changes, whereas other additives may convert some constituents to stable hydroxides, salts or other compounds. Unknown in these treatments however is the possible conversion of the compounds to other forms (such as the products of nitration, sulfonation, oxidation) and organic components. In subsequent analyses, results may not reflect the original identity of the components.

Thus, both advantages and disadvantages are associated with the refrigeration and/or addition of preservatives or additives to a sample. These methods of preservation or stabilization are not recommended for waste samples unless only one or two components or properties are to be analyzed.

Table 3.4 shows only the preservation methods that may be used for solid waste samples. There are several references of standard methods available which list preservation and containerization techniques for various constituents. However, these methods are usually geared toward water samples. The methods in Table 3.4 list methods specifically for solid waste samples, and should be the methods used in sampling solid wastes.

Table 3.2. Sample Containers and Closures Recommended for Various Types of Waste

Waste Type Item	Recommended Container	Recommended Closure
Oil wastes (except pesticides, HC,* chlorinated HC, and photosensitive wastes)	Linear polyethylene (LPE) bottles, 500 ml, wide mouth	LPE caps
Pesticides, HC, and chlorinated HC	Glas bottles, 1/2 gal. or 500 ml	Bakelite caps with Teflon liner
Photosensitive wastes	Amber LPE or brown glass bottles, wide-mouth, 500 ml or VOA bottles	LPE caps for the LPE bottles; Bakelite caps with Teflon liner for the glass bottles
Concentrated sample of any kind	Sample vial packed in vermiculite and steel can for transport	Provided with vial

*HC = hydrocarbon

Table 3.3. Number of Samples to be Collected

Case No.	Information desired	Waste type	Container type	Number of samples to be collected
1	Average concentration	Liquid	Drum, vacuum truck and similar containers	1 Collected with tube
2	Average concentration	Liquid	Pond, pit, lagoon	1 Composite sample of several samples collected at different sampling points or levels
3	Average concentration	Solid (powder or granular)	Bag, drum, bin sack	Same as Case #2
4	Average concentration	Waste pile & landfill	—	Same as Case #2
5	Average concentration	Soil	—	1 Composite sample of several samples collected at different sampling areas
6	Concentration range	Liquid	Drum, vacuum truck, storage tank	3 to 10 separate samples, each from a different depth of the liquid
7	Concentration range	Liquid	Ponds, pit, lagoon	3 to 20 separate samples from different sampling points and depths
8	Concentration range	Solid (powder or granular)	Bag, drum, bin	3 to 5 samples from different sampling points
9	Concentration range	Waste pile & landfill	—	Same as Case #8
10	Concentration range	Soil	—	3 to 20 separate samples from different sampling areas

Table 3.3. Number of Samples to be Collected

Case No.	Information desired	Waste type	Container type	Number of samples to be collected
11	Average concentration for legal evidence	All types	All containers	3 Identical samples or 1 composite sample divided into 3 identical samples if homogeneous
12	Average concentration	Liquid	Storage tank	Same as Case #2
13	Average concentration	Liquid	Storage tank	Same as Case #6

Table 3.4 Containers, Preservation, Holding Times for Solid Waste Samples of Known Composition[1,7]

PHYSICAL STATE	ORGANIC			INORGANIC		
TEST PARAMETER	Solid	Slurry[2]	Liquid	Solid	Slurry[2]	Liquid[3]
For leaching [4]	Glass, Cool at 4°C, 7 days holding time			Plastic or glass, hold at amb., temp., indef.	Plastic or glass, Cool at 4°C, 7 days holding time	
Residues	Plastic or glass, Cool at 4°C, 7 days holding time					
Sulfide					Plastic or glass, Cool at 4°C, Zinc acetate soln[5], 28 days holding time	
COD, TOC, TP Phenols, TKN, $NO_3 - NO_2$					Plastic or glass, Cool at 4°C, H_2SO_4 to pH <2, 28 days holding time	
Hg					Plastic or glass, HNO_3 to pH <2, 14 days holding time	
Cr (VI), BOD	Plastic or glass, Cool at 4°C, 24 hrs. holding time				Plastic or glass, Cool at 4°C, 24 hrs. holding time	
NH_3-N					Plastic or glass, Cool at 4°C, H_2SO_4 to pH <2, 28 days holding time	
Cyanide, total and amenable to chlorination	Amber glass or plastic, Cool at 4°C, shield from light, 24 hrs. holding time				Add NaOH to pH >12 14 days holding time	
Radioactivity Metals except Cr(VI) and Hg	Plastic or glass, Cool at 4°C, 28 days holding time				Plastic or glass, HNO_3 to pH <2 6 months holding time	
$SO_4^=$					Plastic or glass, Cool at 4°C, 28 days holding time	
F^-, Cl^-, Br^-	Plastic or glass (F^- plastic only), 28 days holding time					
Biological	Plastic or glass, Cool at 4°C, 6 hrs. holding time					
pH, Spec. Cond.	Determine on-site within 2 hrs. of collection[6]					
Organics, Extractable	Glass (TFE - fluorocarbon), Cool at 4°C, extraction within 7 days, analysis within 30 days					
Organics, Purgeable	Glass (Hermetically sealable, TFE - fluorocarbon cap or septum), Cool at 4°C, 14 days holding time, fill completely, no headspace					
Ignitability	Glass, cool at 4°C, 24 hrs. holding time					
Corrosivity, Toxicity	Plastic or glass, Cool at 4°C, 7 days holding time					

Table 3.4 (Continued)

Footnotes
Standard Recommended Practice
for Waste Samples.

1. It is recommended that all samples be maintained at 4°C when degredation is expected.

2. For the purposes of this Table, a slurry is a solid-liquid mixture that is at least 0.5% by weight non-filterable solids and is pourable as in the sense of liquid.

3. Inorganic liquids include aqueous leachates.

4. A liquid waste, i.e., a waste containing less than 0.5% nonfilterable solids, would probably not require leaching of its solids.

5. Zinc acetate, 2N. (Dissolve 220g $Zn(C_2H_3O_2)_2 \cdot 2H_2O$ in 870 ml water; this makes 1 liter solution. Test for residual sulfide using lead acetate paper. Add additional zinc acetate solution if necessary.

6. This recommendation applies primarily to freshly generated wastes. Wastes that have been stored for a length of time would not be expected to exhibit a significant change provided that samples are not subjected to temperatures significantly different from that of the waste itself. Samples of stored wastes may therefore be held longer than 2 hours but should still be analyzed as soon as practicable.

7. This protocol is not recommended for use with samples of unknown composition. <u>For samples of unknown composition, cool at 4°C in glass containers, only.</u>

SECTION 4. GROUNDWATER MONITORING SAMPLING PROGRAM

4.1. Well Sampling - Well sampling considerations include the areas of preparation, purging, field measurements, sample collection and containerization and preservation.

4.1.1 Preparation

This section outlines the steps and procedures that must be completed prior to the actual site visit. These activities will have to be undertaken at the regional office or in a facility equipped with the proper supplies and utilities.

a. Sampling Plan

Each time a sampling activity is required at a site which has not been previously sampled by bureau personnel, a sampling plan should be formulated. The sampling plan should consider the following items: (1) site identity and location; (2) site map which shows the number, specific location, and permanent identification of monitoring points to be sampled; (3) well construction and development; (4) parameters to be tested; (5) based upon parameters selected, types of samples to be collected, sampling equipment, sample containers, laboratory coordination, preservatives and chain of custody; and (6) number of field staff to adequately obtain all samples within a 24-hour period, if possible.

b. Sample Containers and Preservatives

Before embarking on a sampling trip, the anticipated numbers and types of samples to be taken should be determined. The number of wells and type of samples from each well should be used to determine this.

i. Number and sizes of sample bottles should be determined; several extra bottles should be carried to the field.

ii. If the yields of the wells are known to be sufficient, all bottles should be labeled with the well number and special information (such as fixing agents to be added) prior to going to the field.

iii. The appropriate preservatives to be used should be determined and provision made to dispense the appropriate amount or added to the empty bottles prior to going to the field.

iv. Secure sufficient ice chest volume and ice to chill the samples that require this (generally it is a good idea to chill all samples except those that are chemically fixed and samples for radio-active analyses).

v. Secure sufficient numbers of disposable filtration equipment to field filter at each well. If some of the wells are known to be particularly turbid, extra filters or units should be included for those wells.

c. Field Log

A field log should be maintained in a bound notebook. This log will be utilized during each site visit. In addition to the sampling plan, the log will keep a record of pertinent information collected during each sampling effort, since it is very important to maintain an accurate log. This log may be the only record of your activities at the site.

The information should be entered into the field log:

i. Sample number. This number should be the same number as entered on the chemical analysis sheet.

ii. Date and time samples were taken.

iii. Location and identification of the monitoring well.

iv. Other important information that may be significant such as field parameters measured, ground-water temperatures, water level, appearance of sample, sample splits taken or offered to the owner/operator, etc.

d. Equipment Cleaning

The following guidelines provide methods for cleaning sampling equipment used by the Bureau for sampling wells.

i. Portable Pump

- o Disassemble the pump by unscrewing the discharge-hose adaptor and removing the inlet screen; then, remove the four Phillips screws which secure the pumphead to the motor case. (Do not remove the single screw at the base of the motor housing.)
- o Clean the Teflon rotors and the stainless stator in warm detergent solution, using a stiff bristled brush to clean the parts. The hose adaptor, pumphead, screen and screws should also be cleaned and, if deemed necessary, they too may be scoured with a brush.
- o Rinse all parts with tap water.
- o Rinse all parts with 10% nitric acid solution.
- o Rinse all parts with distilled water. (Note: Procedure to be detailed later.)
- o Reassemble pump and rinse internally and externally with ASTM Type IV or better reagent grade water.

ii. Submersible Pump

Since these pumps usually remain dedicated to one well, cross contamination is not a problem. If for any reason the pump is removed or relocated to another well, the decontamination procedures described above should be followed, except that the pump need not be disassembled.

iii. Bailers

- o Clean bailer and rope with warm detergent solution.
- o Rinse with tap water.
- o Rinse bailer with 10% nitric acid solution.
- o Rinse bailer and rope twice with distilled water, once with ASTM Type IV or better reagent grade water, drain, and air dry in an uncontaminated area.
- o Place clean bailers and ropes in clean transportation tubes or wrap in clean aluminum foil

iv. Field Filtration Apparatus

- o Non-Disposable Filtration Apparatus

  Disassemble permanent filtration kit parts, then
  Wash all parts in warm detergent solution, then
  Rinse all parts with tap water, then
  Rinse all parts with 10% nitric acid solution, then
  Rinse all parts twice with distilled water, once with ASTM Type IV or better reagent grade water, and then air dry.

- o Disposable Filtration Apparatus

  No cleaning is required for the disposable apparatus since it is only used one time and then disposed. Care should be taken to properly dispose of the apparatus.

  However, the plastic hose connecting the vacuum pump to the filtration apparatus should be cleaned, as described above, whenever hose contamination is suspected.

v. Sample Bottles

All sample bottles are pre-cleaned at the central laboratory (bacteria bottles, special organic bottles, etc.) and do not require cleaning. The disposable plastic sample bottles should be used directly as obtained from the laboratory, but should receive a field rinse with sample water prior to actual sample collection.

vi. Water Level Indicator

This device should be cleaned in the office with detergent solution followed by a tap water rinse and a final distilled water rinse. Between wells, the level indicator should be rinsed with distilled water.

SPECIAL NOTE: Whenever sampling equipment is severely contaminated with organics such as oil, special decontamination procedures should be followed. A detergent solution should be used first, if visible contamination remains on the equipment, it may be necessary to use a solvent rinse. Laboratory grade hexane will usually be sufficient to remove most organics. The equipment should then be subjected to the normal cleaning procedure once the solvent residue has been air-dryed. Normally, this cleaning procedure will be done in the lab.

e. Inspection and Calibration of Field Instrumentation

i. pH Meters

- o The instrument manufacturer's instructions should be followed for check-out and calibration. It is important to use two buffers during calibration, since a one-buffer calibration may not suffice for litigation purposes.

- o Buffers should be used within the expiration date given on the container. Cross-contamination between buffers should be eliminated by using separate measuring containers for each buffer (not the buffer container itself). A distilled water rinse should be performed on the probe between calibration.

ii. Conductivity Meters

- o The instrument manufacturer's instructions should be carefully followed to insure proper operation, checkout, calibration and measurement.

- o Since absolute conductivity values are required for the ground-water monitoring program, the meter should be checked with a known conductivity standard. This is important since the cell constant of the probe can change due to wear, contamination, etc. Conductivity standards are very temperature dependent so it will be necessary to use a temperature correction chart together with a temperature measurement of standard conductivity solution during the calibration procedure.

iii. Temperature

Field temperature instruments should be calibrated against an NBS certified thermometer once every six months.

iv. Water Level Indicator

The water level indicator should be tested according to the manufacturer's directions. The correct operation of the instrument should be verified using a tap water sample prior to the site visit.

v. Portable Pump and Battery

The pump should be checked for proper operation prior to the sampling effort. The battery should be kept fully charged to prevent failure during the sampling effort. If the battery is fully charged, the DC ammeter will register 0.5 amps or less when in the charge mode. If the battery is less than fully charged, the ammeter will register between 0.5 to upwards of 1.1 amps.

4.1.2 Purging

a. Changes in Water Quality in a Borehole

In order to take a sample which represents the actual water quality in the aquifer being monitored, it is necessary to properly purge the well. Water which has been standing in the well for some period of time has probably undergone changes in temperature, volatiles, metals, pH, and organics concentration. Temperature changes are due, of course, to contact between ambient air and the surface of the water in the well. Temperature changes affect the solubility of volatile materials and metals, resulting in the mass transfer of volatiles as gases or vapor and the precipitation of solids, including metals. Loss of volatiles and precipitation of solids result in pH shifts which exacerbate water quality changes. In addition, organics, as well as a number of inorganics, can be altered by biological activity.

b. Purging Volume

Several approaches have been used to define the amount of purging required prior to collection of a truly representative sample. From the literature, continuous monitoring of the water during the purging process for such parameters as specific conductance, pH, temperature and any combination of these has been advocated. When the values of these parameters have stabilized, the well may be considered to be adequately purged.

Others have advocated the use of values ranging from as low as one to as much as ten well volumes. (A well volume may be defined as the volume of the water column between the water surface and the bottom of the well.) Studies indicate that there is little change in water quality after flushing five well volumes.

Because of the relative ease and simplicity of using the five well volumes, this will normally be the basis for purging. However, in low yield wells, it may not be practical to purge five well volumes because of the time required for recovery of the well.

Well volume may be conveniently calculated by use of the following table:

Table 4.1:

Nominal Well Diameter (in inches)	Approximate Gallons Per Foot
2	0.164
3	0.367
4	0.653
6	1.468
8	2.610
10	4.078
12	5.872

A larger well, such as one 8" in diameter and having a water column of 50' would contain over 130 gallons of water. Purging of five volumes would require removal of 650 gallons. By comparison, a 4" well with a 50' water-column would require the purging of about 165 gallons. The best situation is to have a permanently installed pump in the monitoring well. This is usually not the case. Bailing to purge even the 4" well could be excessively labor-intensive; purging should therefore normally be done using a pump. Portable rotary-gear pumps are available at each Regional Office.

c. Precautions in Initial Water Level Measurement

If previous sampling results are available for the wells to be sampled, the order of sampling should go from the highest to lowest quality water. If the well has a permanently installed pump, water level may be measured through a hole in the well housing. Otherwise, after arriving at the well site, the locking metal cap should be carefully removed and placed on the vehicle or some other place where it will not be subject to contamination from dirt or any other foreign material.

d. Measurement Technique

The static water level should be measured by carefully lowering the end of the electrical depth measuring meter until contact is made with the surface of the water in the well. It is advisable to look down the well with a flashlight or Brunton mirror to make certain the probe has reached the water surface. After the initial deflection, the probe should be raised until the needle deflects toward zero (left) again. The probe should then be lowered very slowly until a positive deflection of the needle is noted again. At this point, the distance from the surface of the water to the edge of the casing top should be measured and recorded. Performing this static water level measurement also makes certain that no blockage is in the well which might result in loss of a relatively expensive pumphead.

e. Purging With Permanently Installed Pumps

If the well has a permanently installed pump (submersible or other type), the pump merely needs to be started and operated until the required five well volumes have been purged (as calculated from the table in Table 4.1). For low yield wells, i.e., those requiring in excess of three hours for recovery, lesser volumes may be permissible.

f. Purging With A Portable Pump

If the well has no installed pump, the portable pump should normally be used. This pump is of stainless steel construction with Teflon gear impellers. The pumphead weighs about 6.5 pounds and is readily dismantled for internal decontmaination by removing four screws. It comes equipped with a standard 100-foot length of nylon reinforced 1/2" pvc hose. A 10-foot Teflon connector may be used to join the pump to the pvc hose. For deeper wells, 100-foot supplemental hoses are available. The pump should deliver about 1.6 gpm at 30 feet of head, 1.0 gpm at 100 feet and about 0.5 gpm at 170 feet. This pump is powered by four 6-volt Gel Cel batteries rated at 12 ampere hours. At full loading, the pump draws about 5.0 amps, giving a minimum of 2.4 hours of continuous run time per charge. Care should be taken to eliminate any flow restrictions in the hose due to kinks or weight on the hose, especially on sharp surfaces such as the well casing.

Assuming that the battery pack is adequately charged, the pump should be attached to the hose and electrical connector, taking care to see that the electrical insulation covers the connectors. Next, make certain that the forward/reverse toggle switch is in the forward position.

Lowering of the pumphead into the well may now begin. Care must be taken to keep the hose and wire from touching the ground or any other source of contamination. Lower the pump by slowly unwinding hose and wire from the backpack reel. The hose is marked in five-foot intervals and based upon the prior water level measurement. The approximate point of contact with the water surface can be determined. The pump should be lowered until the pump intake is 24" below the static water level. The on/off/charge toggle switch should now be placed in the "on" position and operation of the pump verified by the sound and deflection of the meter. The time should be noted when flow is established and the pumping rate should be measured using a 5-gallon bucket and timer. Purging should be continued until five casing volumes have been removed. If the well draws down and the pump begins to draw air, the pump should be slowly lowered as pumping proceeds until (1) the pump achieves equilibrium with the inflow, or (2) the bottom of the well is reached. Based upon the measured pumping rate and the original volume of the water column, a yield can be calculated. If recovery time exceeds three hours, the five well-volume requirement will not be required and as little as one well volume may be acceptble. When the purging has been completed, the field measurements may be taken.

g. Pumping With the Submersible Pump

In cases where the large well volume makes purging with the portable pump too time consuming, use of the 1/2 horsepower submersible pumps may be justified. Difficulty in handling and decontamination tend to restrict the usefulness of this type of pump. Satisfactory decontamination of the submersible pump is virtually impossible in the field so that probably only one well per day can be sampled with high integrity, using the submersible, since it should be returned to the laboratory for decontamination. The submersible pump has accessories, including a 2,250 watt generator with starter switch, hose and wires, which may also require decontamination.

Use of the submersible pump is as follows: After a depth measurement has been taken as previously described, and the well has been checked to be certain no blockage exists, the submersible pump should be made ready for lowering into the well. Assuming that the pump will be lowered from a reel on the back of a vehicle and that the pump, hose, suspension cable or rope and the wire to the generator have been properly installed, the lowering of the pump may begin. Special care must be taken to ensure that the pump, hose, suspension cable or rope, as well as the wire, do not come in contact with dirt or any foreign material which may contaminate the well. If the well is screened, the pump should be slowly lowered into the well until it is in position with the pump intake about four feet below the static water level. The generator should now be started. When the generator is in satisfactory operation, the pump may be turned on using the toggle switch in the starter box. When flow has been established, the time should be recorded and, using a five-gallon bucket, the pump rate should be determined. Pumping should be continued until five casing volumes have been purged, based upon time and pumping rate and compared with the calculated well volume. On low yield wells, the pump will have to be lowered continuously as pumping proceeds, until (1) the pump achieves equilibrium with the inflow, or (2) the bottom of the well is reached. Again, based upon the measured pumping rate and the original volume of the water column, a yield can be calculated. If recovery time exceeds three hours, the five well-volume requirement may be modified.

h. Purging With Bailer

In some extreme cases, it may be necessary to purge a well by bailing. In such cases, the bailer should be either of Teflon or stainless steel construction. Cases in which purging by bailing may be justified include small-diameter wells and instances when pumps are unavailable or inoperative. Also, when well yields are quite low, bailing may be less objectionable and not so prohibitively labor-intensive.

The use of deep sea reel and stainless steel line can significantly improve the efficiency and desirability of bailing. As with pumping, the calculated well volume needs to be known. Also, the volume of the bailer and the number of bailer volumes removed from the well need to be carefully recorded. With bailing, however, only one or perhaps two well volumes will normally be removed. Care must always be exercised to minimize or prevent contamination of ropes or cables.

4.1.3 Field Measurements

a. Final Water Level Measurement

When purging has been completed and just prior to collection of samples, a final water-level measurement should be taken and recorded. If the well has a permanently installed pump, the water level may again be measured through a hole in the well housing using the water level measuring meter. Otherwise, the water level may be measured and recorded as described under Item 4.1.2.d. Pumping time should be recorded at the time the final water level is taken.

b. Temperature

i. Immersion Thermometer

After the final water level has been measured and recorded, temperature should be checked by collecting a fresh sample from the pump discharge or from a bailer. Preferably, a sample of approximately 500 ml should be used. Temperature is measured by removing the immersion thermometer from its plastic case and placing it into the sample. Allow approximately two minutes for the level of the mercury to stabilize (reach equilibrium with the sample), read and record the temperature.

ii. Conductance Meter and Thermometer

Alternately, the temperature may be measured using the Yellow Springs Instrument Model 33 meter. Using the meter instead of the immersion thermometer, it may be necessary to zero the meter first by turning the bakelite screw on the meter face. The meter is next calibrated by turning the Mode Control to Redline and adjusting the Redline Control so that the meter needle lines up with the redline on the meter face (if this cannot be done--replace batteries). Now, plug the probe into the probe jack on the side of the instrument. Place the probe in the sample, allowing time for the probe to reach equilibrium with the sample. Set the Mode Control to "temperature". Read the temperature on the bottom scale of the meter in degrees Celsius and record.

c. Specific Conductance Meter

Switch the Mode Control on the YSI Model 33 to the X100 scale. If the reading is below 50 on the 0-500 range (5.0 on the 0-50 range), switch to the X10 scale. If the reading is still below 50, switch to the X1 scale. Read the meter scale and multiply the reading appropriately. The answer is expressed in micromhos per centimeter. When reading on the X100 and X10 scales, depress the cell test button. The meter reading should fall less than 2%; if greater, the probe is fouled and the measurement is in error. Clean the probe and remeasure.

d. pH Meter

After the temperature has been measured and recorded, a sample should be collected for field measurement of pH. For this purpose, another 100 to 200 ml of water should be collected, either directly from the pump discharge or alternately by bailing a sample. The pH must be properly maintained with the probe adequately cleaned and the electrolyte at the proper level. The pH meter must also be checked with two buffer solutions of known pH in the anticipated range of pH. The meter should be adjusted to compensate for the temperature of the sample. After the preceding conditions have been met, the pH may now be determined by placing the electrode in the sample and allow about two minutes for stabilization. If the Leeds and Northrup meter is being used, pH is read directly from the dial. If the Digisense unit is used, a direct digital readout can be made.

4.1.4 Sample Collection

After the well has been purged and the field indicator measurements are at the specified readings, the sample may be withdrawn with either a bailer or a pump.

a. The Use of Bailers

i. Surfaces of the bailer which will come into contact with the sample water should be of Teflon or stainless steel composition. Lower the bailer to the pre-determined depth and withdraw the sample from the well. As the bailer is being pulled, be sure the line is either taken up on a reel or in some manner which does not allow the line to contact the ground or other sources of contamination.

ii. If metal analyses are to be requested, the sample must be field filtered. Vacuum filtration or pressure filtation may be used. The final filtering must be through a .45 micron filter but a series of filterings using coarser filters may be acceptable.

iii. If split samples (i.e., samples to be distributed among various parties because of possible legal reasons) are needed and multiple bailings must be pulled, distribute each individual bailing evenly among the participants.

b. The Use of Pumps

i. The surfaces of the pump which will come into contact with the sample water should be of Teflon or stainless steel construction. The pump must be lowered to the predetermined depth.

ii. If possible, the pumping should proceed at a rate no faster than that which the well can recover.

iii. If metal analyses are to be requested, the sample must be field filtered. Vacuum filtration or pressure filtraiton may be used. The final filtering must be through a .45 micron filter but a series of filterings using coarser filters may be acceptable.

c. Blank Samples

i. Blanks are samples collected to confirm that the samples were not contaminated during the sampling.

ii. Blanks should be taken before the well is actually sampled.

iii. To take a blank, run ASTM Type IV or better reagent grade water through the same routine that the actual ground-water sample would go through.

- For bailed samples, the bailer must be filled with ASTM Type IV or better reagent grade water, filtered for metals, poured into sample containers and fixed just as if it was the actual ground-water sample.

- For pumped samples, fill a bucket with ASTM Type IV or better reagent grade water and dip the pump, hose, wire and line in it. This water is then filtered and/or placed in sample containers and fixed as appropriate.

iv. Blanks should be routinely taken at the site just before sampling the last well.

d. Volume of Sample

The volume of sample needed is as specified below (also, see section on contamination):

Metals - 500 ml

Routine inorganics - 1000 ml (may use two 500 ml containers)

Cyanide - 100 ml

Phenols - 100 ml

If the sample is to be split with the site operator, these quantities must be doubled.

e. Field Cleaning of Sampling Equipment

All sampling equipment that must be cleaned in the field (except for ground-water pumps) should use the procedure outlined in 4.1.1.d. Clean the equipment at the well at which the sampling has just been completed and then move to the next well (disposable filter equipment obviously need not be cleaned).

f. Non-Routine Parameters (Organic and Radioactive)

i. Use teflon coated or stainless steel bailers only. Lower line to proper depth. As the bailer is pulled up, be sure the line does not contact ground or other contaminating objects. If additional bailings must be taken, distribute each individual bailing evenly among the participants.

ii. Clean equipment by following the same procedure for cleaning equipment used for routine sampling.

iii. Generally one-half gallon (.5 gal.) glass containers should provide sufficient volume for organic analysis. Special bottles with teflon caps must be used for volatile organic analysis (VOA). These are are available from the lab. (Prescheduling with laboratory is necessary to obtain sample vial.) Blanks must be taken as described for routine parameters.

iv. For radioactive sampling, a 4 litre cubitainer must be used. These are also available from the lab.

5. Containerization and Preservation

a. Containers

The containers used for a particular sample is determined by the analyses that will be requested for that sample and the different types of preservation required for the analyses of interest. The size of the sample must be taken into account to assure that sufficient sample is availble for the laboratory to perform all requested analyses.

The following are the minimum amounts of sample needed for each parameter. When possible, a 500 milliliter Nalgene plastic or glass french square bottle should be used for each type of sample that requires separate preservation methods. For low yield wells, or samples that are difficult to filter, the minimum sample size may be used to calculate the volume of sample required for each group of parameters.

Table 4.2

Parameter	Minimum Sample Needed
pH	50 milliliters
chloride	10
sulfate	10
fluoride	10
nitrate nitrogen	10
turbidity	50
total organic carbon	100
total organic halogen	400

Samples Requiring Separate Chemical Preservation

(a 500 milliliter bottle is preferred but the following minimums may be used if necessary).

Parameter	Minimum Sample Volume	Preservatives
cyanide	100 milliliter Nalgene bottle	NaOH to pH >12
phenol	100 milliliter Nalgene bottle	H_2SO_4 to pH <2
metals (all)	250 milliliter (500 milliliter Nalgene bottle ½ full)	HNO_3 to pH <2
iron manganese and sodium	100 milliliter Nalgene bottle	HNO_3 to pH <2

For additional information, refer to Appendix C.

Samples That Require Special Containers

Parameter	Container
drinking water pesticides (Endrin, Lindane, Methoxychlor, Toxaphene, 2, 4-D, 2, 4, 5-TP Silvex)	½ gallon organic cleaned glass with foil or teflon lined cap (two) ½ gallon containers preferred but one will suffice at the expense of increasing the detection limit)
coliform bacteria	sterile 100 milliliter plastic bacti bottle (Nalgene)
volatile organic analyses (VOA)	40 milliliter VOA vial (prescheduling with the laboratory is necessary to obtain sample vial)
radioactive analyses (Radium, Gross Alpha, Gross Beta) with	4 liter cubitainer (prescheduling laboratory is necessry to obtain container)

b. Preservation

The general preservation method is to keep the samples cool, either by packing in an ice chest with ice, or refrigeration at 4^{o} Centigrade. Measures should be taken to prevent sample from freezing during severe cold winter months. Lowered temperature inhibits both biological and chemical reactions that change the nature of the sample. Certain analyses require additional chemical preservatives or fixing agents to prevent biological or chemical actions from alterating certain parameters. These are as follows:

Metals - All samples for metal analyses should be fixed with a solution of nitric acid (reagent grade) mixed in a ratio of 1 volume acid to 1 volume distilled deionized water. This solution is available form the Bureau of Laboratories. The ratio of 1:1 HNO_3 to sample is approximately 1 milliliter fixing agent to 100 milliliter sample or 1%. For a 500 milliliter sample bottle 5 milliliters of 1:1 HNO_3 should be added after field filtration of the sample. The nitric acid keeps the metals in the sample in solution and prevents the metals from precipitating. When labeling the sample container, use the designation METALS in large letters to indicate to the lab that the sample has been fixed.

Cyanide - A sodium hydroxide solution (available from the Bureau of Laboratories) should be added to the samples for cyanide analyses in the ratio of 1 milliliter sodium hydroxide solution to 100 milliliters sample. Sodium hydroxide keeps the cyanide solution alkaline and prevents the formation of hydrogen cyanide gas. When labeling the sample container, use the designation CYANIDE.

Phenol - A sulfuric acid (available from the Bureau of Laboratories) should be added to the samples for phenol analyses in the ratio of 1 milliliter sulfuric acid solution to 100 milliliters of sample. When labeling the sample container, use the designation PHENOL.

c. For a complete list of containers, preservatives and holding times, see the EPA listing in Appendix D.

4.2 Lysimeter Sampling

Samples are removed from lysimeters by the method described by the manufacturer. Static water level is not read, and the cup is not flushed prior to sampling. The same precautions must be observed in the sampling of lysimeters as pertain to the sampling of monitoring wells.

4.3 Spring Sampling

Sometimes surface water points are also included in a monitoring program as a means of assessing the landfill's impact on water resources. The point being sampled should be clearly marked by a visible stake as near as possible to the sampling spot. A spring sample should be collected as close to the point of emergence from the ground as possible to minimize any changes in the sample due to aeration. It may be necessary to dig a depression at the point of emergence for proper sampling. Any visible turbidity should be allowed to clear before sampling is attempted.

To take the sample, place the sampling bottle in the water with the opening down. Turn the opening upright at an angle of approximately 45° with the opening 6-12 inches below the surface. Do not disturb the stream bottom or sides upstream from the sample site during sampling, and do not allow water close to the surface into the bottle. If necessary, further discussion of these sampling methods may be found in Standard Methods, Section 105 - Collection and Preservation of Samples.

4.4 Sampling From Domestic Water Supplies - See sampling plan for the Bureau of Community Environmental Control, Division of Water Supplies.

SECTION 5
SAMPLING OF SOILS

5.0 Introduction

The objective of any sampling routine, whether it involves sampling a waste, groundwater, or soil is to obtain a sample that is representative of the population or in this case, the soil being sampled. A number of studies have indicated that more error is introduced during the sampling of soils than is introduced during the analysis of those soils (1, 3, 5, 6 and 7).

Due to the heterogeneity of soils both horizontally and vertically, sampling is a difficult problem and will, as in other types of sampling, depend on the objective of the program and the ingenuity of the investigator. The best that can be specified at this time are some basic facts and concepts that may serve as a general guide in formulating a sampling program.

A number of investigators have purported to provide sampling procedures but are in reality not much more than a compilation of some basic information. A number of pertinent references have been listed at the end of this section.

5.1 Sampling Concepts

5.1.1 A soil may be regarded as a heterogeneous body in which certain chosen parameters have been grouped and values for which vary over a given range forming a homogeneous population. A sampling routine, therefore, must insure that only one soil or soil horizon is sampled (3).

5.1.2 Soils vary both horizontally and vertically. Generally, the variations in soil units decrease with increasing depth in the soil profile, therefore, the rate or frequency of sampling necessary will decrease with depth (1).

5.1.3 Chemical properties and fertility levels vary horizontally, vertically, with treatment and over time (2, 8).

5.1.4 The variation of fertility levels is generally greater in soils that have been farmed than in virgin soils (6). The variation is likely due to crop management program, type of crop, and conservation practices.

5.1.5 There has been shown to be no significant difference between results of analysis for samples collected with a tube, spade or trowel. (9) Tools, however, that taper or are not of a constant diameter or cross section do contribute to sampling error.

5.1.6 The soil population should be divided horizontally and vertically into sampling units which are as homogeneous as possible, and the several sources of variations within the population should be sampled if it is desired to say something valid about the population from the sample (1).

5.1.7 As the number of samples increase, sampling error will diminish so long as one continues to sample the same population (1).

5.1.8 For soil morphology and genesis studies, composite samples can seldom be justified (1).

5.2 Sample Types (1)

5.2.1 Judgment samples are probably the most common type of sample taken. This is simply a sample taken whereby a judgment is made by the sampler based on his knowledge of the soil, the site and personal observations as to where the most representative sample of a soil type can be collected. Such samples are unquestionably biased and assessments of their accuracy is not possible. This type of sample is very useful for situations where the investigator is only taking a limited number of samples. Depending on the knowledge of the investigator, this type of sample, may in fact, constitute less error than a sample taken at some statistically random point.

This type of sample is especially valuable for assessing the impact of a spill or illegal discharge since it is often necessary to evaluate the maximum impact of the spill. Field analytical techniques, such as pH paper, Hnu meter, and the portable GC are often useful for defining the area to be sampled.

5.2.2 Simple random samples involve the random selection of a sampling point usually through the use of random number tables. In practice, a field or profile may be divided into small areas or distances and by the use of the random number tables sampling points are selected on a grid or coordinate systems laid out arbitrarily over the site. Samples taken in this manner show progressively less error with increasing numbers of samples collected.

5.2.3 A stratified random sample is a refinement of a simple random sample. By this method, a particular soil or horizon is divided into smaller subpopulations for purposes of making inferences or statements about the subpopulation and to enhance sample precision. The object is to make the units within the population more homogeneous compared to the variation of the mean of the whole population, which is often unduly influenced or skewed by any one subpopulation or unit. This type of sample will further eliminate error in sampling and generally the precision will increase with an increase in numbers of stratification. It must be kept in mind, however, that the gain in precision is smaller with each division until no further gain can be attained. The increase in numbers of analyses must also be considered and weighed against actual gain in precision.

5.2.4 A systematic sample is also an attempt at increasing the precision in sampling. This type of sampling uses a grid pattern superimposed over the site and samples are taken at the grid intersections or at points equal distances away from each other. It has generally been found that this type of sampling is more favorable when compared to the other forms of sampling, except in the case where population has a repeating period or trend which may cause problems with multiplying errors or unduly biasing the results. This problem of trends, however, is rarely found in nature. A comparison between rectangular grid patterns and triangular grid patterns has shown triangular patterns to be the more favorable.

5.2.5 The composite sample is one of the most commonly used types of samples. This sampling procedure consists of taking a number of subsamples from a population, combining by mixing and then performing the analysis. The purpose of this type of sampling procedure is based on the assumption that a valid estimate of the mean of some parameter will be obtained by combining subsamples. This will be true if all subsamples are drawn from the same population and each contribute the same amount of influence on the composite. It also should be pointed out that composites only provide an estimate of a mean of a parameter and that no statements may be stated or inferred from the variance about the mean or the contribution to the mean by each part. This method has been used widely in soil fertility work due to the fewer numbers of analyses needed, and it has proven to provide reliable estimate of the mean. The number of subsamples that should comprise the composite is difficult to estimate and generally beyond the scope of this protocol. For more information, the reader is directed to reference (1) Black, C.A. Another problem involved with this method, is insuring that proper mixing of the composite is accomplished, as well as insuring each subsample is of equal volume. This is discussed in more detail later in this section.

5.3 Sampling Plan

A plan or scheme should be decided upon prior to sampling. The plan should be designed around the purpose for sampling and complexity of the site. The actual samples must be supportive of the purpose and capable of producing valid results. As an example, the types and numbers of samples collected for measuring soil nitrogen requirements for reclaiming strip mined lands will be far less complicated than a sampling routine designed to measure, for enforcement reasons, the migration of volatile organics from the site of a spill.

5.3.1 Site Background Information

Background information on a site is important and should include accurate soil maps and a history of the site as to past uses. Samples will only be meaningful if the same soil unit or population is being sampled. One cannot sample two separate populations or heterogeneous units and attempt to make valid statements about either one. Accurate soils maps are, therefore, essential.

Most soil sampling routines are aimed at making a reasonable estimate of a mean of some parameter and normally will involve either composite samples or averaging of a number of simple random samples. In some cases, however, it may be necessary to design a statistically sound sampling program from which it is desired to make some statistical measurements as to variance, confidence levels or to apply some other statistical test. In these cases, it is important to know the minimum number of samples needed and to follow a procedure from which statistically meaningful data can be drawn. It is advised that in these situations the sampling program be reviewed by someone familiar with statistical methods.

5.3.2 Equipment and Cleaning

Samples collected for which chemical analyses are to be performed, the type of container and the equipment cleaning techniques to be used must be considered. Generally, plastic bags or containers are suitable for most samples except where organic analysis are to be requested. Samples collected for organic analysis should be shipped in glass containers with aluminum foil placed under the cap. It is probably adequate for most sampling purposes to clean the sampling equipment by brushing the equipment off with a stiff brush and wiping with a clean cloth. If sampling is being done for enforcement reasons, clean the equipment by the following methods: scrub in a warm, soapy solution, rinse with tap water and rinse again with two additinal rinses of ASTM Type IV or better reagent grade water. Where teflon or stainless steel equipment is used for sampling for metals, a dilute nitric acid rinse following the tap water rinse is suggested.

No one sampling tool has been found to give more statistically valid results than another as long as the tool has a consistent cross-section and on taperings or irregularities in the sampling end. The type of tool chosen obviously will depend on such things as the type of soil, depth of interest and whether an undisturbed soil core is needed.

5.3.3 Sampling and Preservation

Preservation of a sample normally will not be necessary except where volatilization is a factor. In these cases, airtight seals are needed on the containers and the sample should be cooled to 4°C.

Compositing samples properly in the field is more difficult than first appears, and is often the source of a good deal of error. Compositing may be accomplished by using one of the following two suggested methods:

A. For loose granular soil, place all the aliquots into a clean, compatible container and either stir or shake until the subsample is thoroughly mixed. Be careful to use a compatible tool for stirring and a compatible container cover for shaking. Another procedure is to spread the aliquots evenly over a clean, compatible, piece of plastic. Mix the sample by lifting a corner of the sheet and drawing it across, low down, to be opposite corner in a manner that the material is made to roll over and over and does not merely slide along. Continue operation with each corner, proceeding in a clockwide direction. Repeat this operation ten times.

B. For cohesive soils, mixing is much more difficult due to the tendency of the soil to stick together forming clods and lumps. It should be emphasized that the larger the sample the more effort that will be needed in the mixing process.

Stirring or mixing in a large container is probably the most commonly used methods and probably the least effective. Other methods that might be used include: spreading the sample out evenly over a clean, compatible piece of plastic and working the corners back and forth pressing the sample as it rolls over; or the sample can be placed in a clean, compatible, plastic bag and the sample is then worked by squeezing and pressing the bag by hand.

Field mixing of cohesive soils usually results in only a partially mixed sample; therefore, the laboratory should be requested to further mix the sample. The laboratory is better equipped to properly mix the sample. Depending on the type of analysis to be conducted, the sample may be physically changed such as through slurrying with distilled water and mixing in a semi-liquid state resulting in a more thoroughly mixed sample. The sample may also be dried, crushed and mixed. These operations should only be done by lab personnel familiar with the tests and the type of analysis requested. Be sure and make such requests on the lab sheets.

5.3.4 Volumes

Volumes of samples depend on the type of analysis to be performed. For most chemical analyses, a few hundred grams is sufficient. Physical parameters, such as compaction and permeabilities, will require 10-50 pounds of soil. When in doubt, check with the lab or Central Office.

5.3.5 Labeling

Labeling should be done in the office whenever possible. The label should contain the same information specified in Section 2 on General Considerations. Shipping requirements as well should follow those specified for waste materials.

5.3.6 Record Keeping

Keeping records that are complete and accurate is important. The records should detail sampling locations, sample numbers, date of sampling, types of analyses requested and any special information observed or special instructions to the lab. Accurate field notes are especially important for litigation purposes.

5.4 Sampling Land Treatment and Sewage Sludge Sites

5.4.1 All soil series of five (5) acres or more, should be sampled.

5.4.2 Penn State recommends (10) taking soil cores from at least 15 spots chosen randomly over the field and compositing. Each composite should not represent more than 20 acres. Procedures for compositing and choosing random points is left to the discretion of the sampler.

5.4.3 Sample between rows, and avoid old fence rows, dead furrows and other spots that are not representative of the field.

5.4.4 If problem areas exist and are five (5) acres or more, take separate samples from it.

5.4.5 Scrape away and discard any surface debris and sample to plow depth or depth of incorporation. Sample pastures to a six (6) inch depth.

REFERENCES CITED

1. Peterson, R.G. and L.D. Calvin. 1955. Sampling. In C.A. Black (ed.) Methods of soil analysis. Agronomy 9:54-72. Amer. Soc. of Agron., Madison, Wis.

2. Cline, M.G. 1944. Principles of soil sampling. Soil Sci. 58:275-288.

3. Childs, F.D. and E.M. Jencks. 1967. Effect of time and depth of sampling upon soil test results. Agron. J. 59:537-540.

4. Hammond, L.C., W.L. Prichett and V. Chew. 1959. Soil sampling in relation to soil heterogeneity. Soil Sci. Soc. Amer. Proc. 22:548-552.

5. Hemingway, R.C. 1955. Soil sampling errors and advisory analyses. J. Agr. Sci. 46:1-8.

6. Leo, M.W.M. 1963. Heterogeneity of soil sampling. J. Agr. Food Chem. 11:432-434.

7. Reed, J.F. and J.A. Rigney. 1947. Soil sampling for fields of uniform and nonuniform appearance and soil types. J. Amer. Soc. Agron. 3926-40.

8. Peck, T.R. and S.W. Melsted. 1973. Field sampling for soil testing. In L.M. Walsh and J.D. Benton (Eds.) Soil testing and platn analysis. Soil Sci. Soc. of Amer., Madison, Wis.

9. Welch, C.D. and J.W. Fitts. 1956. Some factors affecting soil sampling. Soil Sci. Soc. Amer. Proc. 20:54-56.

10. Beegle, Douglas. Successful crops start with good soil samples. PSU.

SECTION 6
SURFACE WATER SAMPLING

6.1 Field Sampling Procedures - Chemical

To obtain a representative sample, many precautions are necessary. Some of these precautions and general sampling rules are:

6.1.1 The sample should be taken where the wastewater is well mixed, i.e. near a parshall flume or a location in pipe or sewer with turbulence. Weirs tend to enhance the settling of solids immediately upstream and the accumulation of floating oil or grease immediately downstream. For these reasons weirs should be avoided as a sampling location.

6.1.2 The sample should be taken in the center of the channel of flow where the velocity is highest and the possibility of settling is at a minimum. To avoid an excess of floating materials, the mouth of the collecting container should be placed a few inches below the surface.

6.1.3 Stream samples should be collected near mid-stream where flow is rapid and the stream is well mixed whenever possible (unless conditions dictate otherwise). When collecting stream samples for chemical analysis, submerge the mouth of the bottle under the water and move it upstream away from the hand. Make sure the hand is not close to the top of the bottle to prevent contamination of the sample.

6.1.4 Stream samples for water quality network are sometimes collected from bridges with the use of a bucket. The bucket should be rinsed twice with the sample water to prevent influence from the previous sample. The sample should be thoroughly mixed before pouring into sample bottle.

6.1.5 Kemmerer Samplers are used to sample wells by lowering the samples into the casing to prescribed depth. A messenger is then dropped which causes the sampler to close. Be sure the sampler is clean before use.

6.1.6 When collecting samples of petroleum products the sample collected should be representative of the discharge. Oil samples collected for quantitative analysis should not be skimmed from the surface. For qualitative analysis, the oil or other petroleum product can be skimmed from the surface to concentrate the sample for easier identification by the laboratory. The Department's Rules and Regulations, Chapter 97.63 limit the discharge of oil to 15 mg/l as a daily average and not more than 30 mg/l oil discharged at any time. Under the NPDES program a facility is considered to be in violation if there is a visible sheen.

All samples collected will be in accordance with 40 CFR part 136 (page 10) or approved variance. Samples from the Harrisburg Region are hand carried to the laboratory. Samples from the other five regions are picked up by Purolator at predesignated pick-up points and delivered to the laboratory by the morning following sampling. The analysis sheet and label for sample bottle should be completed immediately after sample is collected. The legal seal must be affixed immediately after the sample is collected. All samples should be immediately recorded in the sample log book.

6.2 Field Sampling Procedures - Bacteriological

When collecting samples from ponds and streams for bacteriological analysis, you should hold the bottle approximately halfway down from the top of the bottle. Be careful not to touch the top of the bottle while removing the cap which would cause contamination. Hold bottle approximately six inches beneath the water surface and move bottle upstream away from you to prevent contamination. When collecting sewage or water quality network samples, the sample should be poured into the bacteriological bottle from the sampling container.

NOTE: Do not rinse bacteriological sample bottle prior to collecting sample. Sodium thiosulfite is placed in the sample bottles to neutralize any residual chlorine.

6.3 Field Instruments - Calibration and Preventive Maintenance

6.3.1 pH Meter

Electrode method - Enter the make, model, and inventory sticker number for meter in its log book. Calibrate the system agains standard buffer solutions of known pH at the start of sampling. When checking the second buffer, the meter should read within ± 0.1 pH units of the known value. Replace electrode if the variation is greater than 0.1 pH units. Periodically check against the buffers during sampling and record the data in the log book. In case of erratic meter responses, check for weak batteries or fouled electrodes. Check response and linearity following highly acidic or alkaline samples. Allow additional time for equilibrium in these instances. Check against the closest reference solution each time a violation is found. Rinse electrodes thoroughly with distilled water between samples and after calibration. The tip of the pH electrode should be stored in distilled water and kept moist to function properly. If the pH meter is faulty, return it to the manufacturer for repair. Keep a record of field maintenance and manufacturers repairs in its log book.

6.3.2 Dissolved Oxygen Meter

Membrane electrode - Enter the make, model, serial and inventory sticker number for each meter in its log book. Calibrate the meter following the manufacturer's instructions. Check the membrane for air bubbles and holes. Change the membrane and KCl solution as needed. Check leads and switch contacts for corrosion and shorts. If meter pointer remains off scale, the DO meter should be calibrated with the winkler azide method at least once per month to be sure it is functioning properly. The repair record for the meter should be recorded in its log book.

6.3.3 Conductivity Meter

Enter the make, model, serial and inventory sticker number for meter in log book. Calibrate the meter following the manufacturer's instructions. The batteries for the conductivity meter provide approximately 200 hours of operation. Zinc carbon D cell batteries should not be used. Alkaline D cells must be used if accuracy is to be maintained. Batteries should be replaced every six months to prevent the possibility of corrosion from leaky batteries. The electrode should be cleaned if it appears to be providing low readings. The electrode can be cleaned by soaking for 5 minutes in a tile cleaning preparation such as DOW, Johnson or lysol. If you suspect your meter is inaccurate, request a standard testing solution from the Bureau of Laboratories to test meter.

6.3.4 Colormetric Kits

The Hach DPD colormetric chlorine kit is used for field measurement of chlorine residuals. Field persons required to use the Hach kit should not be color blind. The powder pillows for free and total chlorine should be used before expiration date. The colormetric wheel should be changed at least every two years because the color fades and causes faulty readings.

There are a few Hach colormetric wide range pH kits in the field offices. These kits are only used as a backup when the pH meter breaks down in the field. The precautions for the colormetric pH kit are the same as the DPD colormetric chlorine kit.

6.3.5 Dye Studies

Both Rhodamine B and Uranine Dyes are acceptable for use as tracers in dye studies. Uranine can only be used in areas that are alkaline. Uranine (fluorescein) dye produces a brilliant green color in alkaline solution, but gives no color in acid solution. Rhodamine B in high concentrations imparts a red color to the water, but in low concentrations does not yield a visible color. It has the advantage, however, of being detectable in extremely low concentrations by fluorometric techniques. When doing a dye study, the usual procedure is to add approximately 10 grams of powdered dye to a bucket of water, mix, then pour into waste stream.

6.3.6 Automatic Sampler

Record make, model, serial and inventory sticker numbers for sampler in its log book. Also include record of field maintenance and repairs done by the manufacturer. Study manufacturer's instruction manual for proper operation of sampler. Check flow of sampler each sample period to determine if quantity of sample collected is sufficient for survey and analysis. Make sure all bottles and sampling tubes are clean. Check battery to be sure it is fully charged. This can be determined by speed of pump when unit is turned on. Check silicon pump tubing and replace if worn. If sampler is not operating satisfactorily return to factory for repair.

6.3.7 Flow Meter

Record the make, model, serial and inventory sticker numbers for meter in its log book. Use manufacturer's instruction manual, furnished with the meter to become familiar with its operation. Check battery to be sure it is fully charged. Change level of bubbler tube in water to determine if flow meter is operating properly. If meter is faulty, return it to manufacturer for repair. Maintenance record for meter is recorded in its log book.

SECTION 7

AIR SAMPLING

See Bureau of Air Quality Control sampling proceedures.

Appendix A. Random Sampling
Random Numbers

03	47	43	73	86	36	96	47	36	61	46	98	63	71	62
97	74	24	67	62	42	81	14	57	20	42	53	32	37	32
16	76	62	27	66	42	81	14	57	20	42	53	32	37	32
12	56	85	99	26	96	96	68	27	31	05	03	72	93	15
55	59	56	35	64	38	54	82	46	22	31	62	43	09	90
16	22	77	94	39	49	54	43	54	82	17	37	93	23	78
84	42	17	53	31	57	24	55	06	88	77	04	74	47	67
63	01	63	78	59	16	95	55	67	19	98	10	50	71	75
33	21	12	34	29	78	64	56	07	82	52	42	07	44	38
57	60	86	32	44	09	47	27	96	54	49	17	46	09	62
18	18	07	92	46	44	17	16	58	09	79	83	86	19	62
26	62	38	97	75	84	16	07	44	99	83	11	46	32	24
23	42	40	64	74	82	97	77	77	81	07	45	32	14	08
52	36	28	19	95	50	92	26	11	97	00	56	76	31	38
37	85	94	35	12	83	39	50	08	30	42	34	07	96	88
70	29	17	12	13	40	33	20	38	26	13	89	51	03	74
56	62	18	37	35	96	83	50	87	75	97	12	25	93	47
99	49	57	22	77	88	42	95	45	72	16	64	36	16	00
16	08	15	04	72	33	27	14	34	09	45	59	34	68	49
31	16	93	32	43	50	27	89	87	19	20	15	37	00	49

HOW TO USE THE TABLE OF RANDOM NUMBERS:

1. Based on available information, segregate the containers (i.e., drums, sacks, etc.) according to waste types.

2. Number the containers containing the same waste types consecutively, starting from 0.1.

3. Decide on how many samples you wish to take. This number is usually determined by the objective of the sampling. For regular surveillance sampling, the collection of one or two samples is usually adequate. In this case, random sampling is not necessary. But for regulatory or research purposes, more samples (such as one sample for every group of five containers) taken at random will generate more statistically valid data. Hence, if there were 20 drums containing the same type of waste, 5 drums have to be sampled.

4. Using the set of random numbers above, choose any number as a starting point.

5. From this number, go down the column, then to the next column to the right, or go in any predetermined direction until you have selected five numbers between 01 and 20, with no repetitions. Larger numbers are ineligible.

   Example: If you were to choose 19 as the starting point on column four, the next eligible numbers as you go down this column are 12 and 04. So far you have chosen only three eligible numbers. Proceed to the next column to the right. Going down and starting from the top of this column, the next eligible numbers are 12 and 13. But 12 is already chosen. Proceeding to the sixth column, the next eligible number is 16. Your five random numbers, therefore, are 19, 12, 04, 13 and 16. Thus the drums with corresponding numbers have to be sampled.

APPENDIX B

STANDARD PRACTICE FOR SAMPLING WASTE IMPOUNDMENTS[1]

1. Scope

1.1 This practice describes approaches and methods for sampling waste impoundments. The sampling practices should be used to obtain samples of the distinct components or strata within an impoundment, or to obtain composite samples describing the average composition within the impoundment.

1.2 The methods described apply to granular, liquid, or semi-liquid wastes contained in impoundments. Impoundments include waste storage, treatment and disposal facilities such as ponds, basins, or lagoons.

1.3 The usefulness of the final samples of the solid waste in the impoundment will be dependent on the number of samples collected over the volume of the impoundment. The more samples collected and sampling points considered, the more useful the sample results are likely to be. The sampling personnel should decide on the number of samples required based on the precision required, time and budget available, and safety.

2. Applicable Documents

2.1 ASTM Standards: D3987 Standard Method for Shake Extraction of Solid Waste With Water[2]; E122 Standard Practice for Choice of Sample Size to Estimate the Average Quality of a Lot or Process[3]

[1]This method is under the jurisdiction of ASTM Committee D-34 on Waste Disposal and is under the direct responsibility of Subcommittee D34.01.
[2]Annual Book of ASTM Standards, Volume 11.04.
[3]Annual Book of ASTM Standards, Volume 14.02.

3. Summary of Practice

3.1 Accurate information about the waste to be sampled is important to determine the types of sampling equipment to be used, the safety precautions to be observed, and the types of sample containers and preservatives to be used. Information needed about the wastes includes hazardous chemical properties, physical properties of the wastes, such as whether it consists of liquids, slurries, dry powders, or granules, and the uniformity of the wastes.

3.2 Background information on the distribution of wastes within the impoundment is essential. Stratification of the impoundment sometimes occurs as heavier particles or denser liquids settle out first. Segregation can also result from batch manufacturing processes. It is necessary to determine the entrance and exit points of the impoundment as well as its approximate dimensions.

3.3 Design of the sampling program should consider both the areal variations and vertical stratification of the waste. The number of sampling points considered and samples collected will depend on the precision desired and other factors as mentioned in 1.3.

3.4 Samples should be taken using the appropriate sampling equipment. The samples may be analyzed separately or composited for analysis.

4. Significance and Use

4.1 Impoundments are used for the storage, treatment and disposal of solid wastes. The practices described here provide a means of sampling impoundments to obtain samples of the wastes. The sampling procedures described are general and are offered only as an aid in assisting sampling personnel in evaluating how to obtain a representative sample. These procedures are most applicable for sampling a homogeneous body of liquids, sludges or solids. Situations in which stratification, layering or liquid and solid phasing occurs may require obtaining and separately analyzing samples of each of the distinct phases.

5. <u>Safety Precautions</u>

5.1 Proper safety precautions must always be observed when sampling hazardous wastes. Persons collecting samples must be aware that the waste can be a strong sensitizer and can be corrosive, flammable, explosive, toxic, and capable of releasing extremely poisonous gases. The background information obtained about the waste should be helpful in deciding the extent of safety precautions to be observed and in choosing protective equipment to be used. The following safety precautions are <u>not</u> comprehensive. Rather, they provide additional guidance on health and safety to complement professional judgement and experience.

5.2 Personnel should wear protective equipment when response activities involve known or suspected atmospheric contamination; when vapors, gases, or particulates may be generated; or when direct contact with skin-affecting substances may occur. Respirators can protect lungs, gastrointestinal tract, and eyes against air toxicants. Chemical-resistant clothing can protect the skin from contact with skin-destructive and -absorbable chemicals. Good personal hygiene limits or prevents ingestion of material.

Equipment to protect the body against contact with known or anticipated chemical hazards has been divided into four categories according to the degree of protection afforded:

- <u>Level A</u>: Should be worn when the highest level of respiratory, skin, and eye protection is needed.
- <u>Level B</u>: Should be selected when the highest level of respiratory protection is needed, but a lesser level of skin protection. Level B protection is the minimum level recommended on initial site entries until the hazards have been further defined by on-site studies and appropriate personnel protection utilized.
- <u>Level C</u>: Should be selected when the type(s) of airborne substance(s) is known, the concentration(s) is measured, and the criteria for using air-purifying respirators are met.
- <u>Level D</u>: Should not be worn on any site with respiratory or skin hazards. Is primarily a work uniform providing minimal protection.

The Level of Protection selected should be based primarily on:

- Type(s) and measured concentration(s) of the chemical substance(s) in the ambient atmosphere and its toxicity.
- Potential or measured exposure to substances in air, splashes of liquids, or other direct contact with material due to work being performed.

In situations where the type(s) of chemical(s), concentration(s), and possibilities of contact are not known, the appropriate Level of Protection must be selected based on professional experience and judgement until the hazards can be better characterized.

5.2.1 Level A Protection

Personnel protective equipment:

- Pressure-demand, self-contained breathing apparatus, approved by the Mine Safety and Health Administration (MSHA) and National Institute of Occupational Safety and Health (NIOSH).
- Fully encapsulating chemical-resistant suit.
- Coveralls.*
- Long cotton underwear.*
- Gloves (outer), chemical-resistant.
- Gloves (inner), chemical-resistant.
- Boots, chemical-resistant, steel toe and shank. (Depending on suit construction, worn over or under suit boot).
- Hard hat*(under suit).
- Disposable protective suit, gloves, and boots* (worn over fully encapsulating suit).
- 2-way radio communications (intrinsically safe).

The fully encapsulating suit provides the highest degree of protection to skin, eyes, and respiratory system if the suit material is resistant to the chemical(s) of concern during the time the suit is worn and/or at the measured or anticipated concentrations. While Level A provides maximum protection, the suit material may be rapidly permeated and penetrated by certain chemicals from extremely high air

*Optional

concentrations, splashes, or immersion of boots or gloves in concentrated liquids or sludges. These limitations should be recognized when specifying the type of chemical-resistant garment. Whenever possible, the suit material should be matched with the substance it is used to protect against.

Many toxic substances are difficult to detect or measure in the field. When such substances (especially those readily absorbed by or destructive to the skin) are known or suspected to be present and personnel contact is unavoidable, Level A protection should be worn until more accurate information can be obtained.

5.2.2 Level B Protection

Personal protective equipment

- Pressure-demand, self-contained breathing apparatus (MSHA/NIOSH approved).
- Chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; hooded, one- or two-piece chemical-splash suit; disposable chemical-resistant coveralls).
- Coveralls.*
- Gloves (outer), chemical-resistant.
- Gloves (inner), chemical-resistant.
- Boots (outer), chemical-resistant, steel toe and shank.
- Boots (outer), chemical-resistant (disposable).*
- Hard hat (face shield*).
- 2-way radio communications (intrinsically safe).

Level B equipment provides a high level of protection to the respiratory tract, but a somewhat lower level of protection to skin. The chemical-resistant clothing required in Level B is available in a wide variety of styles, materials, construction detail, permeability, etc. These

*Optional

factors all affect the degree of protection afforded. Therefore, a specialist should select the most effective chemical-resistant clothing (and fully encapsulating suit) based on the known or anticipated hazards and/or job function.

For initial site entry and reconnaissance at an open site, approaching whenever possible from the upwind direction, Level B protection (with good quality, hooded, chemical-resistant clothing) should protect response personnel, providing the conditions described in selecting Level A are known or judged to be absent.

5.2.3 Level C Protection

Personal protective equipment

- Full-face, air purifying, canister-equipped respirator (MSHA/NIOSH approved).
- Chemical-resistant clothing (coveralls; hooded, two-piece chemical splash suit; chemical-resistant hood and apron; disposable chemical-resistant coveralls).
- Coveralls.*
- Gloves (outer), chemical-resistant.
- Gloves (inner), chemical-resistant.*
- Boots (outer), chemical resistant, steel toe and shank.
- Boots (outer), chemical-resistant (disposable).*
- Hard hat (face shield*).
- Escape mask.*
- 2-way radio communications (intrinsically safe).

Level C protection is distinguished from Level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for Level C is that conditions permit wearing air-purifying devices.

Total unidentified vapor/gas concentrations of 5 ppm above background require Level B protection. Only a qualified individual should select Level C (air-purifying

*Optional

respirators) protection for continual use in an unidentified vapor/gas concentration of background to 5 ppm above background.

5.2.4 Level D Protection

Personal protective equipment

- Coveralls.
- Gloves.*
- Boots/shoes, leather or chemical-resistant, steel toe and shank.
- Boots (outer), chemical-resistant (disposable).*
- Safety glasses or chemical splash goggles.*
- Hard hat (face shield).*
- Escape mask.*

Level D protection is primarily a work uniform. It should be worn in areas where: (1) only boots can be contaminated, or (2) there are no inhalable toxic substances.

5.3 Personnel should not eat, drink, or smoke during or after sampling until after decontamination steps are taken. Sampling personnel should be trained in safety aspects of hazardous waste sampling.

5.4 Sampling of lagoons may pose potential exposure hazards with toxic gases from the lagoon, during transfers of samples from the dipper, and for personnel falling into the lagoon. Recommended sampling procedures are for collection of samples from the edge of the lagoons. Sampling from boats in a lagoon is not recommended and should be attempted only if the sampler knows the waste poses no real health problem and every possible safety measure has been taken.

6. Sampling Design

6.1 The number of sampling locations and numbers of samples to be collected at each location are important considerations in the sampling design. These numbers will be determined by factors such

*Optional

as the properties of the wastes in the impoundment, the degree of precision desired, and the costs of collecting and analyzing the wastes. As the number of samples analyzed increases, a better estimate of the unknown level of pollutants can be obtained.

6.2 To obtain a descriptive sample of the waste, the concentration levels and approximate variation in the waste composition should first be estimated. If the wastes in the impoundment are stratified or segregated by area then provisions should be made for sampling the individual waste types by forming separate strata of the universe or population and then conducting independent sampling in each stratum. In some cases, a rough estimate on waste composition variation can be made based on a knowledge of the processes which produce the waste. In other cases, results from previous sampling efforts can be used to estimate waste composition and variability. Or a preliminary pilot sampling effort may be necessary to establish the waste composition prior to designing the primary sampling program.

6.3 Using the estimated sample composition and variance either from a pilot sampling effort or engineering judgement, the number of samples required, n, to achieve the desired precision in waste composition can be estimated using fundamental statistical concepts, as follows (financial constraints not considered):

$$n = t^2_{0.80} s^2 / d^2 \qquad (1)^4$$

where

n = appropriate number of samples to be collected;

$t^2_{0.80}$ = the square of the tabulated value of Student's t for a two-sided confidence interval and a coverage probability of 0.80 for the unknown mean, with the degrees of freedom defined for the s^2 used to estimate the population variance, σ^2;

s^2 = a preliminary estimate of σ^2 obtained from previous samplings, a pilot sampling effort or other information such as the likely range of the population values;

---

[4]Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, U.S. Environmental Protection Agency, 1982.

d = a deviation to be exceeded only in two cases out of ten in repeated sampling for the quantity $|\bar{X} - \mu|$, the difference in absolute value between the sample average and the population mean.

6.3.1 The variables in equation (1) are appropriate only for a given waste type. Therefore, the appropriate number of samples, n, required to achieve the desired precision is also applicable only to that same waste type. If two or more waste types are present in the impoundment, either as strata or other segregated wastes, then a value for n should be calculated for each waste.

6.3.2 Although the use of Student's t distribution is based on an underlying normal distribution for the measurements, the robustness of the t statistic for many applications may be relied upon here. If ancillary information seems to indicate that normality may not be a good assumption, then a goodness of fit test should be performed to determine if the assumption of a normal distribution is reasonable. The Lilliefors goodness of fit test, as it applies to the pilot sampling presented here, is described in the Appendix. This test involves examining the data from a sampling and analysis program in order to test the hypothesis that the data are distributed normally. If the Lilliefors test shows the contention of normality is acceptable, it does <u>not</u> mean that the parent population is normal. But it does mean that the Student's t distribution does not appear to be an unreasonable approximation to the true unknown distribution. If the Lilliefors test shows that a normal distribution does not adequately fit the data, then further pilot sampling will be required to adequately determine the spatial distributions in the impoundment.

6.3.3 The following hypothetical example illustrates the use of formula (1):

(1) A preliminary study of barium levels in sludge collected from a lagoon generated values of 86, 90, 98

and 104 ppm for barium in four sludge samples. Based on these values and a knowledge of the processes producing the waste, the sludge is judged to be homogeneous (not stratified) within the lagoon. Therefore, preliminary estimates of $\bar{X}$ and s^2 are calculated as:

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{86 + 90 + 98 + 104}{4} = 94.50, \text{ and}$$

$$s^2 = \frac{\sum_{i=1}^{n} x_i^2 - \left(\sum_{i=1}^{n} x_i\right)^2 \Big/ n}{n - 1}$$

$$= \frac{35,916.00 - 35,721.00}{3} = 65.00$$

(2) The deviation not to be exceeded for measured barium in the sludge samples, d, is chosen as 5.50 ppm, i.e., the difference between the sample average and the population mean should not exceed 5.50 ppm at the 80% confidence level.

$$d = |\bar{X} - \mu| = |94.50 - 100.0| = 5.50$$

(3) The value of $t_{0.80}$ is obtained from tabulated values of Student's "t", as shown in Table 1. Although an assumption of a t distribution would seem to be restrictive, it can be shown that even nonnormal populations possessing bell-shaped distributions can be closely approximated by a t distribution. From the preliminary study n = 4, and the degrees of freedom, n-1, is 3. Therefore,

$$t_{0.80} = 1.638$$

(4) The appropriate number of sludge samples to be collected from the lagoon is,

Table 1. Tabulated Values of Student's "t" for Evaluating Solid Wastes

Degrees of Freedom (n-1)[a]	Tabulated "t" value[b]
1	3.078
2	1.886
3	1.638
4	1.533
5	1.476
6	1.440
7	1.415
8	1.397
9	1.383
10	1.372
11	1.363
12	1.356
13	1.350
14	1.345
15	1.341
16	1.337
17	1.333
18	1.330
19	1.328
20	1.325
21	1.323
22	1.321
23	1.319
24	1.318
25	1.316
26	1.315
27	1.314
28	1.313
29	1.311
30	1.310
40	1.303
60	1.296
120	1.289
∞	1.282

[a]Degrees of freedom (df) are equal to the number of samples (n) collected from a solid waste less one.
[b]Tabulated "t" values are for a two-tailed confidence interval and a probability of 0.80 (the same values are applicable to a one-tailed confidence interval and a probability of 0.90).

$$n = t^2_{0.80}s^2/d^2 = \frac{(1.638^2)(65.00)}{5.50^2} = 5.77,$$

or six. That number of samples (plus extra for protection against poor preliminary estimates of $\overline{X}$ and s^2) is collected from the lagoon by a simple random process, as follows.

6.4 The surface area of the impoundment should be divided into an imaginary grid, the number of grids, N, being several times greater than n, the number of samples desired. By use of random numbers selected by simple random sampling, n grid units should be selected for sampling in each stratum. A sample should be collected (or a sample composited from several depths) within each grid. If the impoundment is stratified or is known to be nonrandomly heterogeneous then each stratum or homogeneous area should be divided in grids and sampled separately.

6.5 The sampling plan should include quality assurance procedures. At the least, this should include the following:

- Sample handling quality control by carrying a QC sample of known concentration through all of the sampling and analytical steps; and
- Analytical quality control with duplicate analyses, spike recovery, and analysis of certified standards. Most analytical laboratories should have their own internal quality control procedures.

More rigorous quality control/quality assurance procedures may be required depending on the particular goals of the sampling program.[5]

7. Apparatus

7.1 Pond or Dipper Sampler

7.1.1 The sampler consists of a glass, plastic or other nonreactive beaker clamped to the end of a two- or three-piece telescoping aluminum or fiberglass pole which serves as

[5]Further information on quality control/quality assurance can be found in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, U.S. Environmental Protection Agency, 1982.

the handle. This sampler is for liquids and free-flowing slurries. It can be used as far as 3.5M (11.5 ft) from the bank.

7.1.2 These samplers are not available commercially and must be fabricated to conform to the specifications detailed in Figure 1. Table 2 lists the parts required to fabricate a dipper.

7.2 Trier Sampler

7.2.1 A trier consists of a tube cut in half lengthwise with a sharpened tip that allows the sampler to cut into sticky solids and loose soil. A trier samples moist or sticky solids with a particle diameter less than 1/2 the diameter of the trier.

7.2.2 Triers 61- to 100-cm long and 1.27 to 2.54 cm in diameter, as shown in Figure 2, are available at laboratory supply stores. A larger trier can be fabricated.

7.3 Thief

7.3.1 A thief consists of two slotted concentric tubes usually made of stainless steel or brass (see Figure 3). The outer tube has a conical pointed tip which permits the sampler to penetrate the material being sampled. The inner tube is rotated to open and close the sampler. A thief is used to sample dry granules or powdered wastes whose particle diameter is less than 1/3 the width of the slots. A thief is available at laboratory supply stores.

7.4 Sample Containers

7.4.1 Plastic, glass or other nonreactive containers should be used. Plastic should be used for wastes which are to be analyzed for metals and for wastes containing strong alkali and hydrofluoric acid. Glass containers are preferred for wastes to be analyzed for organics. High density or linear polyethylene plastic containers offer the best combinations of chemical resistance and low cost. Soda glass containers are recommended due to their low cost and availability.

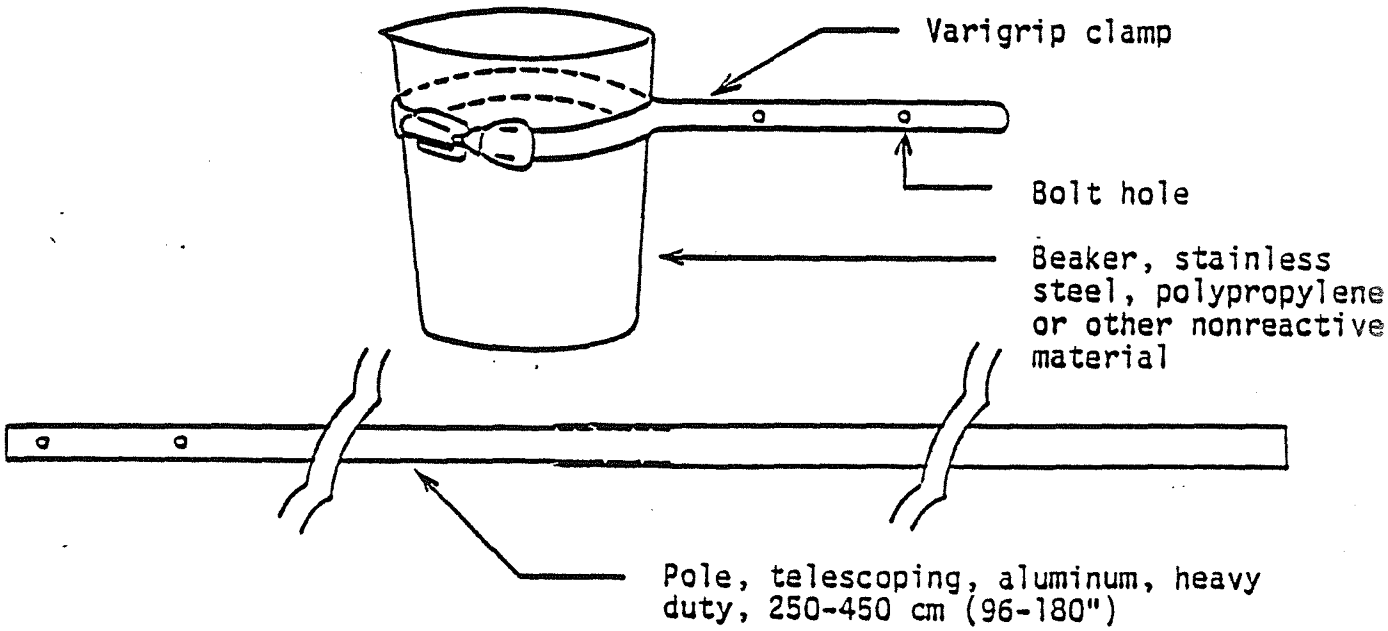


Figure 1. Dipper Sampler (Source: Test Methods for Evaluating Solid Wastes, U.S. EPA, SW-846, July 1982)

Table 2. Parts for Constructing a Pond or Dipper Sampler

Quantity	Item	Supplier
1	Adjustable clamp, 6.4 to 8.9 cm (2 1/2 to 3 1/2") for 250 to 600 mL beakers. Heavy duty aluminum.	Laboratory supply houses
1	Tube 2.5 to 4.5 meters long with joint cam locking mechanism. Diameter 2.54 cm ID and 3.18 cm ID.	Swimming pool supply houses
1	Polypropylene or glass beaker, 250 mL to 600 mL.	Laboratory supply houses
4	Bolts 2 1/4" x 1/4", NC	Hardware stores
4	Nuts, 1/4", NC	Hardware stores

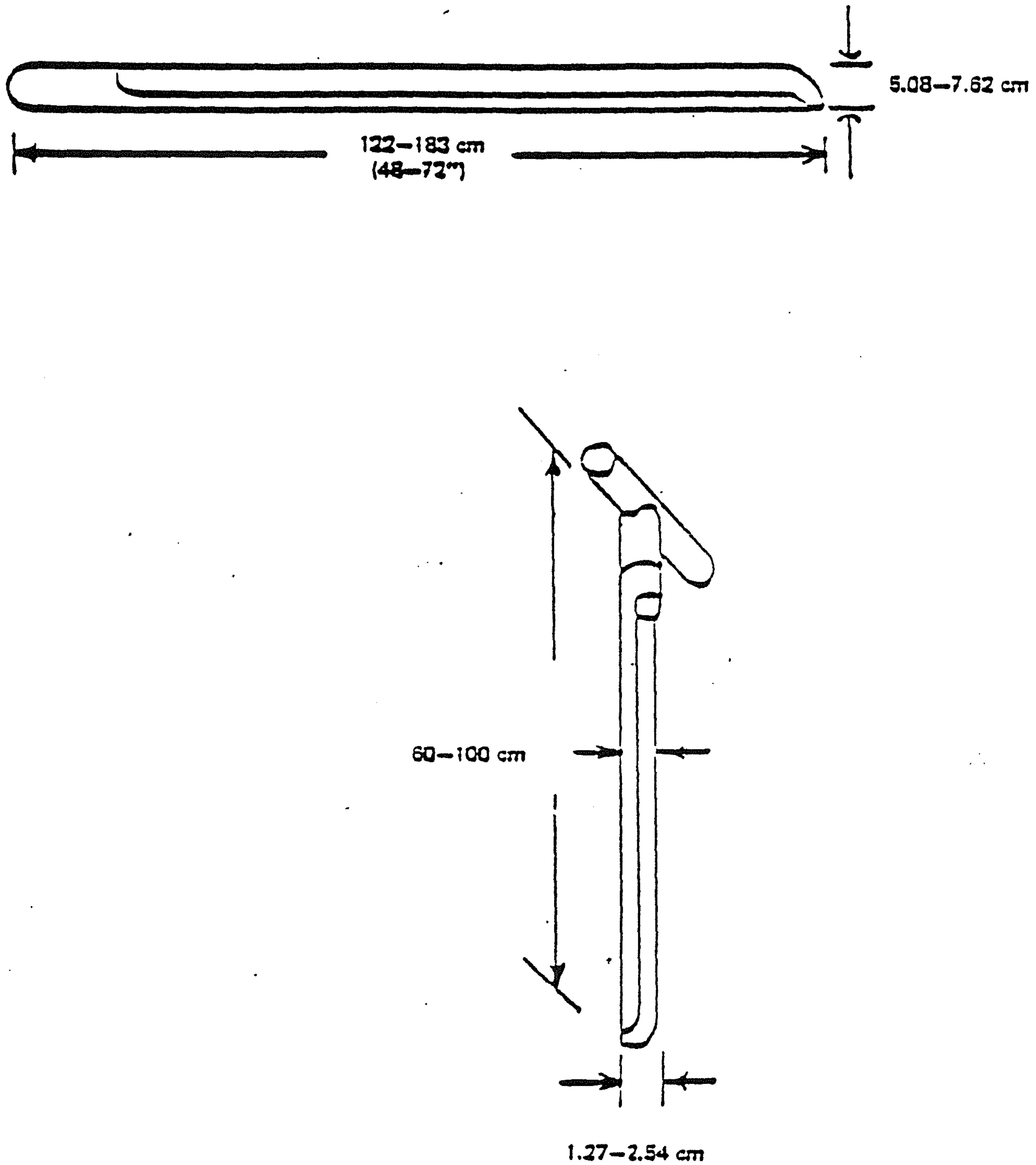


Figure 2. Sampling Triers (Source: Test Methods for Evaluating Solid Wastes, U.S. EPA, SW-846, July 1982)

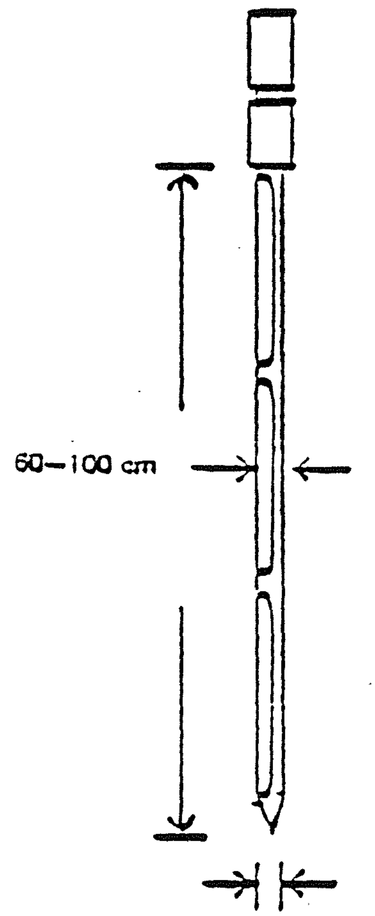


Figure 3. Thief Sampler (Source: Test Methods for Evaluating Solid Wastes, U.S. EPA, SW-846, July 1982)

7.4.2 The containers should have wide mouths with tight, screw-type lids. Teflon cap liners with rigid plastic screw caps should be used with glass containers. The sizes should be 1000 to 2000 mL (1 quart to 1/2 gallon).

8. Sampling Procedure

8.1 All sampling equipment must be cleaned prior to use. In cases where cleaning is difficult or impossible it may be necessary to dedicate sampling equipment to specific areas. The volume of sample required will vary with the intended analyses but in most cases 1000 mL (1 quart) is sufficient.

8.2 Sampling Liquids or Slurries with a Dipper Sampler

8.2.1 Assemble sampler by bolting adjustable clamp to pole. Place beaker in clamp and fasten shut.

8.2.2 Turn sampler so the mouth of beaker faces down and insert into waste. Turn beaker right side up when dipper is at desired depth. Allow beaker to fill completely as shown by cessation of air bubbles.

8.2.3 Raise dipper and transfer sample to container.

8.3 Sampling Moist Solids with a Trier Sampler

8.3.1 Insert trier into waste material 0° to 45° from horizontal. Rotate trier to cut core of the waste.

8.3.2 Remove trier with concave side up and transfer sample to container.

8.4 Sampling Dry Granular Solids with a Thief Sampler

8.4.1 Insert closed thief into waste material. Rotate inner tube to open thief. Wiggle the unit to encourage material to flow into thief.

8.4.2 Close thief and withdraw.

8.4.3 Place sampler thief in a horizontal position with the slots facing upward.

8.4.4 Remove inner tube from thief and transfer sample to a container.

8.5 If compositing of samples is to be performed it is preferable and sometimes necessary to have the laboratory mix the sample. Depending on the type of analysis to be conducted, drying the sample or slurrying with distilled water may be possible in the laboratory to facilitate mixing. The laboratory personnel are better able and equipped to make such decisions and determine what effect such procedures would have on the analysis. If the composite has not been appropriately mixed prior to shipment, this should be clearly indicated on the sample.

8.6 Preservation techniques appropriate for the analyses or testing to be conducted should be used.

9. Sample Labeling and Shipping

9.1 An indelible label should be secured to the container identifying the sample. The label should contain or reference the following information.

9.1.1 Name and location of site.

9.1.2 Date and time of sampling.

9.1.3 Location of sampling.

9.1.4 Sample number.

9.1.5 Description and disposition of sample.

9.1.6 Name of sampling personnel.

9.1.7 Full weight of sample and container upon shipping.

9.1.8 Type of preservative.

9.1.9 Analytical requirements.

9.2 Pack the sample container securely in a shipping container. If the sample is to be analyzed for volatile organics it should be packed in ice and cooled to 4°C. A min-max thermometer should be packed with the sample container.

9.3 Follow DOT shipping regulations.

9.4 Make arrangements for handling, logging in, adequate storage and analysis of the sample at its destination. If warranted, follow chain of custody protocol.

APPENDIX

I. THE LILLIEFORS TEST FOR GOODNESS OF FIT

I.1.

The data consist of a random sample $X_1, X_2, \ldots, X_n$ of size n associated with some unknown distribution function, denoted by F(x). Compute the sample mean

$$\overline{X} = \frac{1}{n}\sum_{i=1}^{n} X_i \qquad (1)$$

for use as an estimate of μ, and compute

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(X_i - \overline{X})^2} \qquad (2)$$

as an estimate of σ. Then compute the "normalized" sample values Z_i, defined by

$$Z_i = \frac{X_i - \overline{X}}{s} \quad i = 1,2,\ldots,n \qquad (3)$$

The test statistic is computed from the Z_i's instead of from the original random sample.

Assumptions

1. The sample is a random sample.

Hypotheses

H_0: The random sample has the normal distribution, with unspecified mean and variance.

H_1: The distribution function of the X_i's is nonnormal.

Test Statistic. Ordinarily the test statistic is the usual two-sided Kolmogorov test statistic, defined as the maximum vertical distance between the empirical distribution function of the X_i's and the normal distribution function with mean $\overline{X}$ and standard deviation s, as given by (1) and (2). However, the following method of computing the test statistic is slightly easier, and is equivalent to the method indicated above.

Draw a graph of the standard normal distribution function, and call it $F^*(x)$. Table I.1 may be of assistance. Also draw a graph of the empirical distribution function of the normalized sample, the Z_i's defined by Equation (3), using the same set of coordinates as was used above for $F^*(x)$. Find the maximum vertical distance between the two graphs, $F^*(x)$ and the empirical distribution function which we shall call $S(x)$. This distance is the test statistic. That is, the Lilliefors test statistic T_2 is defined by

$$T_2 = \sup_x |F^*(x) - S(x)| \tag{4}$$

Decision Rule. Reject H_0 at the approximate level of significance α if T_2 exceeds the $1 - \alpha$ quantile as given in Table I.2.

TABLE I.1. NORMAL DISTRIBUTION*

w_p	p	w_p	p	w_p	p
-3.7190	.0001	-.4677	.32	.5244	.70
-3.2905	.0005	-.4399	.33	.5534	.71
-3.0902	.001	-.4125	.34	.5828	.72
-2.5758	.005	-.3853	.35	.6128	.73
-2.3263	.01	-.3585	.36	.6433	.74
-2.1701	.015	-.3319	.37	.6745	.75
-2.0537	.02	-.3055	.38	.7063	.76
-1.9600	.025	-.2793	.39	.7388	.77
-1.8808	.03	-.2533	.40	.7722	.78
-1.7507	.04	-.2275	.41	.8064	.79
-1.6449	.05	-.2019	.42	.8416	.80
-1.5548	.06	-.1764	.43	.8779	.81
-1.4758	.07	-.1510	.44	.9154	.82
-1.4395	.075	-.1257	.45	.9542	.83
-1.4051	.08	-.1004	.46	.9945	.84
-1.3408	.09	-.0753	.47	1.0364	.85
-1.2816	.10	-.0502	.48	1.0803	.86
-1.2265	.11	-.0251	.49	1.1264	.87
-1.1750	.12	.0000	.50	1.1750	.88
-1.1264	.13	.0251	.51	1.2265	.89
-1.0803	.14	.0502	.52	1.2816	.90
-1.0364	.15	.0753	.53	1.3408	.91
-.9945	.16	.1004	.54	1.4051	.92
-.9542	.17	.1257	.55	1.4395	.925
-.9154	.18	.1510	.56	1.4758	.93
-.8779	.19	.1764	.57	1.5548	.94
-.8416	.20	.2019	.58	1.6449	.95
-.8064	.21	.2275	.59	1.7507	.96
-.7722	.22	.2533	.60	1.8808	.97
-.7388	.23	.2793	.61	1.9600	.975
-.7063	.24	.3055	.62	2.0537	.98
-.6745	.25	.3319	.63	2.1701	.985
-.6433	.26	.3585	.64	2.3263	.99
-.6128	.27	.3853	.65	2.5758	.995
-.5828	.28	.4125	.66	3.0902	.999
-.5534	.29	.4399	.67	3.2905	.9995
-.5244	.30	.4677	.68	3.7190	.9999
-.4959	.31	.4959	.69		

Source: Abridged from Tables 3 and 4, pp. 111-112, Pearson and Hartley (1962).

*The entries in this table are quantiles w_p of the standard normal random variable W, selected so $P(W \leq w_p) = p$ and $P(W > w_p) = 1 - p$.

TABLE I.2. QUANTILES OF THE LILLIEFORS TEST STATISTIC*

	p=.80	.85	.90	.95	.99
Sample size n = 4	.300	.319	.352	.381	.417
5	.285	.299	.315	.337	.405
6	.265	.277	.294	.319	.364
7	.247	.258	.276	.300	.348
8	.233	.244	.261	.285	.331
9	.223	.233	.249	.271	.311
10	.215	.224	.239	.258	.294
11	.206	.217	.230	.249	.284
12	.199	.212	.223	.242	.275
13	.190	.202	.214	.234	.268
14	.183	.194	.207	.227	.261
15	.177	.187	.201	.220	.257
16	.173	.182	.195	.213	.250
17	.169	.177	.189	.206	.245
18	.166	.173	.184	.200	.239
19	.163	.169	.179	.195	.235
20	.160	.166	.174	.190	.231
25	.142	.147	.158	.173	.200
30	.131	.136	.144	.161	.187
Over 30	$\frac{.736}{\sqrt{n}}$	$\frac{.768}{\sqrt{n}}$	$\frac{.805}{\sqrt{n}}$	$\frac{.886}{\sqrt{n}}$	$\frac{1.031}{\sqrt{n}}$

Source: Adapted from Table 1 of Lilliefors (1967), with corrections.
*The entries in this table are the approximate quantiles w_p of the Lilliefors test statistic T_2. Reject H_0 at the level α if T_2 exceeds $w_{1-\alpha}$ for the particular sample size n.

I.2.

The same data used to calculate n, the number of samples required, in Section 6 will be used to illustrate the Lilliefors test.

Barium levels in four sludge samples were 86, 90, 98 and 104 ppm. The sample values, X_i, are arranged from smallest to largest, and converted to Z_i by subtracting $\overline{X}$ = 94.50, and dividing by S = $\sqrt{65.00}$ = 8.06.

X_i	Z_i
86	-1.05
90	-0.56
98	0.43
104	1.18

The null hypothesis of normality is tested with the Lilliefors test statistic

$$T_2 = \sup_x |F^*(x) - S(x)|$$

where $F^*(x)$ is the standard normal distribution function and $S(x)$ is the empirical distribution function of the Z_i's. Figure I.1 shows the curves representing $F^*(x)$ (generated from Table I.1) and $S(x)$. The maximum vertical distance between $F^*(x)$ and $S(x)$ is seen from Figure I.1 to occur at x = -1.05, where $S(x)$ equals 0 and $F^*(x)$ equals 0.15, and so T_2 equals 0.15.

The Lilliefors test calls for rejection of H_0 at α = .05 if T_2 exceeds its .95 quantile, which is given in Table I.2 as

$$W_{.95} = \frac{.381}{\sqrt{n}} = \frac{.381}{\sqrt{4}} = 0.19$$

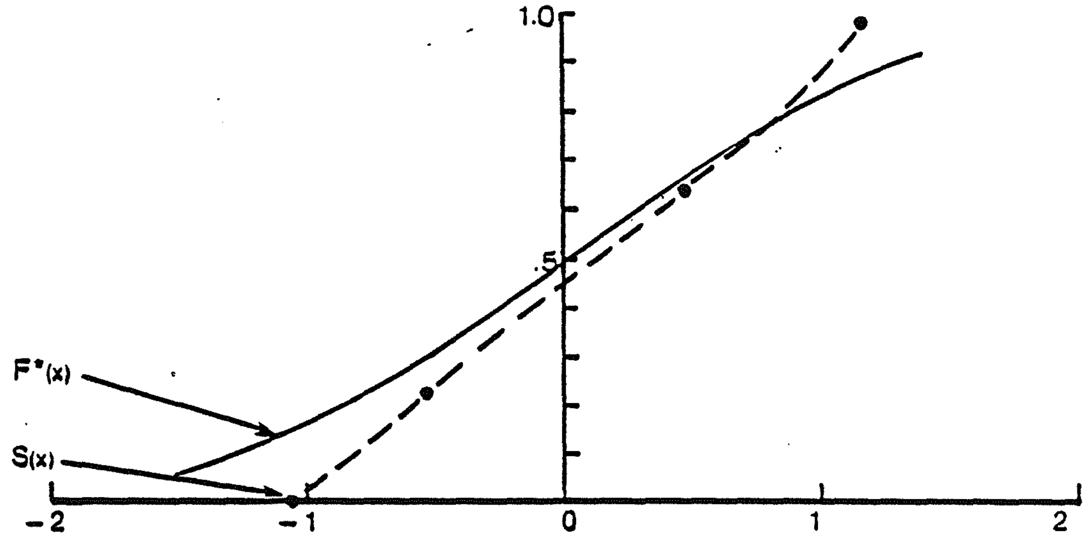


Figure I.1. Graphs of F*(x) and S(x) from Example

Because T_2 equals 0.15, and is less than 0.19, the null hypothesis is accepted. This means that the normal distribution is a reasonable approximation of the true unknown distribution.

STANDARD PRACTICES FOR SAMPLING WASTES FROM PIPES AND OTHER POINT DISCHARGES[1]

1. Scope

1.1 These practices provide guidance for obtaining samples of waste at discharge points from pipes, sluiceways, conduits, and conveyor belts. The following are included:

	Sections
Practice A - Liquid or Slurry Discharges	7 through 9
Practice B - Solid or Semi-Solid Discharges	10 through 12

1.2 These practices are intended for situations in which there are no other applicable ASTM sampling methods (see D140 and D75) for the specific industry.

1.3 This standard does not address flow- and time-proportional samplers and other automatic sampling devices.

1.4 Samples are taken from a flowing waste stream or moving waste mass and, therefore, are descriptive only within a certain time period. The length of the time period for which a sample is descriptive will depend on the sampling frequency and compositing scheme.

2. Applicable Documents

2.1 ASTM standards: D140 Standard Methods of Sampling Bituminous Materials[2]

---

[1]This method is under the jurisdiction of ASTM Committee D-34 on Waste Disposal and is under the direct responsibility of Subcommittee D34.01.
[2]Annual Book of ASTM Standards, Volume 4.03.

D75 Standard Methods of Sampling Aggregates[3]

D3987 Standard Method for Shake Extraction of Solid Waste With Water[4]

E122 Standard Practice for Choice of Sample Size to Estimate the Average Quality of a Lot or Process[5]

3. Summary of Practices

3.1 The variability of the waste stream is first determined based on (1) knowledge of the processes producing the stream, or (2) the results of a preliminary investigation of the waste stream's variability. A sampling design is then developed which considers the waste stream's variability, the time frame the sample is to represent, and the precision and accuracy required for waste analysis or testing. The actual sampling procedure consists of obtaining several grab samples from the moving stream or mass for analysis or testing.

4. Significance and Use

4.1 The procedures outlined in this standard practice are guides for obtaining 'descriptive' samples of solid, semi-solid and liquid wastes from flowing streams, and incorporate many of the same procedures and equipment described in the Applicable Documents. These guidelines by themselves will not necessarily result in the collection of samples representative of the total waste mass. The degree to which samples describe a waste mass must be estimated by application of appropriate statistical methods and measures of quality assurance.

5. Safety

5.1 In all sampling practices, safety should be the first consideration. Personnel involved in the sampling should be fully aware

[3]Annual Book of ASTM Standards, Volume 4.03.
[4]Annual Book of ASTM Standards, Volume 11.04.
[5]Annual Book of ASTM Standards, Volume 14.02.

of, and take precautions against, the presence of toxic or corrosive gases, the potential for contact with toxic or corrosive liquids or solids, and the dangers of moving belts, conveyors or other mechanical equipment. The following safety precautions are not comprehensive. Rather, they provide additional guidance on health and safety to complement professional judgement and experience.

5.2 Where applicable for safety considerations, sampling should be conducted by a team of two or more, where one person is available to assist or obtain help in an emergency. The sampling team members should be aware of, and have access to, the nearest health facility or first aid station.

5.3 Personnel should wear protective equipment when response activities involve known or suspected atmospheric contamination; when vapors, gases, or particulates may be generated; or when direct contact with skin-affecting substances may occur. Respirators can protect lungs, gastrointestinal tract, and eyes against air toxicants. Chemical-resistant clothing can protect the skin from contact with skin-destructive and -absorbable chemicals. Good personal hygiene limits or prevents ingestion of material.

Equipment to protect the body against contact with known or anticipated chemical hazards has been divided into four categories according to the degree of protection afforded:

- Level A: Should be worn when the highest level of respiratory, skin, and eye protection is needed.
- Level B: Should be selected when the highest level of respiratory protection is needed, but a lesser level of skin protection. Level B protection is the minimum level recommended on initial site entries until the hazards have been further defined by on-site studies and appropriate personnel protection utilized.
- Level C: Should be selected when the type(s) of airborne substance(s) is known, the concentration(s) is measured, and the criteria for using air-purifying respirators are met.

- Level D: Should not be worn on any site with respiratory or skin hazards. Is primarily a work uniform providing minimal protection.

The Level of Protection selected should be based primarily on:

- Type(s) and measured concentration(s) of the chemical substance(s) in the ambient atmosphere and its toxicity.
- Potential or measured exposure to substances in air, splashes of liquids, or other direct contact with material due to work being performed.

In situations where the type(s) of chemical(s), concentration(s), and possibilities of contact are not known, the appropriate Level of Protection must be selected based on professional experience and judgement until the hazards can be better characterized.

5.3.1 Level A Protection

Personnel protective equipment:

- Pressure-demand, self-contained breathing apparatus, approved by the Mine Safety and Health Administration (MSHA) and National Institute of Occupational Safety and Health (NIOSH).
- Fully encapsulating chemical-resistant suit.
- Coveralls.*
- Long cotton underwear.*
- Gloves (outer), chemical-resistant.
- Gloves (inner), chemical-resistant.
- Boots, chemical-resistant, steel toe and shank. (Depending on suit construction, worn over or under suit boot).
- Hard hat*(under suit).
- Disposable protective suit, gloves, and boots* (worn over fully encapsulating suit).
- 2-way radio communications (intrinsically safe).

The fully encapsulating suit provides the highest degree of protection to skin, eyes, and respiratory system if the suit material is resistant to the chemical(s) of concern during the time the suit is worn and/or at the measured or

---

*Optional

anticipated concentrations. While Level A provides maximum protection, the suit material may be rapidly permeated and penetrated by certain chemicals from extremely high air concentrations, splashes, or immersion of boots or gloves in concentrated liquids or sludges. These limitations should be recognized when specifying the type of chemical-resistant garment. Whenever possible, the suit material should be matched with the substance it is used to protect against.

Many toxic substances are difficult to detect or measure in the field. When such substances (especially those readily absorbed by or destructive to the skin) are known or suspected to be present and personnel contact is unavoidable, Level A protection should be worn until more accurate information can be obtained.

5.3.2 Level B Protection

Personal protective equipment

- Pressure-demand, self-contained breathing apparatus (MSHA/NIOSH approved).
- Chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; hooded, one- or two-piece chemical-splash suit; disposable chemical-resistant coveralls).
- Coveralls.*
- Gloves (outer), chemical-resistant.
- Gloves (inner), chemical-resistant.
- Boots (outer), chemical-resistant, steel toe and shank.
- Boots (outer), chemical-resistant (disposable).*
- Hard hat (face shield*).
- 2-way radio communications (intrinsically safe).

Level B equipment provides a high level of protection to the respiratory tract, but a somewhat lower level of protection to skin. The chemical-resistant clothing required in Level B is available in a wide variety of styles, materials, construction detail, permeability, etc. These

*Optional

factors all affect the degree of protection afforded. Therefore, a specialist should select the most effective chemical-resistant clothing (and fully encapsulating suit) based on the known or anticipated hazards and/or job function.

For initial site entry and reconnaissance at an open site, approaching whenever possible from the upwind direction, Level B protection (with good quality, hooded, chemical-resistant clothing) should protect response personnel, providing the conditions described in selecting Level A are known or judged to be absent.

5.3.3 Level C Protection

Personal protective equipment

- Full-face, air purifying, canister-equipped respirator (MSHA/NIOSH approved).
- Chemical-resistant clothing (coveralls; hooded, two-piece chemical splash suit; chemical-resistant hood and apron; disposable chemical-resistant coveralls).
- Coveralls.*
- Gloves (outer), chemical-resistant.
- Gloves (inner), chemical-resistant.*
- Boots (outer), chemical resistant, steel toe and shank.
- Boots (outer), chemical-resistant (disposable).*
- Hard hat (face shield*).
- Escape mask.*
- 2-way radio communications (intrinsically safe).

Level C protection is distinguished from Level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for Level C is that conditions permit wearing air-purifying devices.

Total unidentified vapor/gas concentrations of 5 ppm above background require Level B protection. Only a qualified individual should select Level C (air-purifying

*Optional

respirators) protection for continual use in an unidentified vapor/gas concentration of background to 5 ppm above background.

5.3.4 Level D Protection

Personal protective equipment

- Coveralls.
- Gloves.*
- Boots/shoes, leather or chemical-resistant, steel toe and shank.
- Boots (outer), chemical-resistant (disposable).*
- Safety glasses or chemical splash goggles.*
- Hard hat (face shield).*
- Escape mask.*

Level D protection is primarily a work uniform. It should be worn in areas where: (1) only boots can be contaminated, or (2) there are no inhalable toxic substances.

5.4 Personnel should not eat, drink, or smoke during or after sampling until after decontamination steps are taken. Sampling personnel should be trained in safety aspects of hazardous waste sampling.

6. Sampling Design

6.1 The frequency of sampling and the number of composites required to obtain a sample of the waste will depend on the following:

6.1.1 The time variability of the waste composition.

6.1.2 The time span which the sample is to represent.

6.1.3 The precision of waste analysis which is required, e.g., if a hazardous constituent is present in the waste at levels near the regulatory limit or another limit of concern, then greater precision will be required than if the levels are well below the limits of concern.

*Optional

6.2 The processes which produce the waste will largely dictate the variability in the composition of the waste. If the processes are known to be constant and reliable, then fewer samples should be required than from a highly variable process.

6.3 To obtain a descriptive sample of the waste, the concentration levels and approximate variation in the waste composition should first be estimated. In some cases, a rough estimate can be made based on a knowledge of the processes which produce the waste. In other cases, results from previous sampling efforts can be used to estimate waste composition and variability. Or a preliminary pilot sampling effort may be necessary to establish the waste composition prior to designing the primary sampling program.

6.4 For the sampling design, the time period or volume of the waste stream for which a composition estimate is desired must first be defined. If the time period for which estimates are desired is not homogeneous, then suitable strata may be defined. Differences in level of contaminants and in variability of the contaminants may provide bases for stratification.

6.5 A sampling unit should be defined. This unit is the primary sampling unit (psu), which is selected at the first stage of the sampling within each stratum. Define a unit of time for the psu, e.g., amount of discharge of effluent in one second, five seconds, 10 seconds, or whatever time unit is appropriate. Suppose the total period of interest is 1 PM to 6 PM for a given stratum, and 10 seconds of discharge forms a sampling unit. Then the total sampling period comprises 6 x 60 x 5 = 1500 sampling units. As an example for simple random sampling, the sampler might need to take 5 psu's. Random numbers when used could come up as 224, 1403, 286, 381 and 1099. During each of the ten second intervals designated by these random numbers for the set of 1500 such intervals, one sample unit of material would be obtained at the discharge point.

6.6 Using the estimated sample composition and variance either from a pilot sampling effort or engineering judgement, the number of samples required to achieve the desired precision in waste composition can be estimated using fundamental statistical concepts, as follows (financial constraints not considered):

$$n = t^2_{0.80} s^2 / d^2 \quad (1)^6$$

where

n = appropriate number of samples to be collected;

$t^2_{0.80}$ = the square of the tabulated value of Student's t for a two-sided confidence interval and a coverage probability of 0.80 for the unknown mean, with the degrees of freedom defined for the s^2 used to estimate the population variance, σ^2;

s^2 = a preliminary estimate of σ^2 obtained from previous samplings, a pilot sampling effort or other information such as the likely range of the population values;

d^2 = a deviation to be exceeded only in two cases out of ten in repeated sampling for the quantity $|\bar{X} - \mu|$, the difference in absolute value between the sample average and the population mean.

6.6.1 Although the use of Student's t distribution is based on an underlying normal distribution for the measurements, the robustness of the t statistic for many applications may be relied upon here. If ancillary information seems to indicate that normality may not be a good assumption, then a goodness of fit test should be performed to determine if the assumption of a normal distribution is reasonable. The Lilliefors goodness of fit test, as it applies to the pilot sampling presented here, is described in the Appendix. This test involves examining the data from a sampling and analysis program in order to test the hypothesis that the data are distributed normally. If the Lilliefors test shows the contention of normality is acceptable, it does

[6] E122 Standard Practice for Choice of Sample Size to Estimate the Average Quality of a Lot or Process, Volume 14.02.

not mean that the parent population is normal. But it does mean that the Student's t distribution does not appear to be an unreasonable approximation to the true unknown distribution. If the Lilliefors test shows that a normal distribution does not adequately fit the data, then further pilot sampling will be required to adequately determine the temporal distributions at the discharge point.

6.6.2 The following hypothetical example illustrates the use of formula (1):

(a) A preliminary study of barium levels in sludge collected from a discharge pipe generated values of 86, 90, 98 and 104 ppm for barium in four sludge samples. Based on these values and a knowledge of the processes producing the waste, the sludge is judged to be a continuous, homogeneous stream. Therefore, preliminary estimates of $\overline{X}$ and s^2 are calculated as:

$$\overline{X} = \frac{\sum_{i=1}^{n} X_i}{n} = \frac{86 + 90 + 98 + 104}{4} = 94.50, \text{ and}$$

$$s^2 = \frac{\sum_{i=1}^{n} X_i^2 - \left(\sum_{i=1}^{n} X_i\right)^2 / n}{n - 1} = \frac{35{,}916.00 - 35{,}721.00}{3} = 65.00$$

(b) The deviation not to be exceeded for measured barium in the sludge samples, d, is chosen as 5.50 ppm, i.e., the difference between the sample average and the population mean should not exceed 5.50 ppm at the 80% confidence level.

$$d = |\overline{X} - \mu| = |94.50 - 100.0| = 5.50$$

(c) The value of $t_{0.80}$ is obtained from tabulated values of Student's "t", as shown in Table 1. Although an assumption of a t distribution would seem to be

Table 1. Tabulated Values of Student's "t" for Evaluating Solid Wastes

Degrees of Freedom (n-1)[a]	Tabulated "t" Value[b]
1	3.078
2	1.886
3	1.638
4	1.533
5	1.476
6	1.440
7	1.415
8	1.397
9	1.383
10	1.372
11	1.363
12	1.356
13	1.350
14	1.345
15	1.341
16	1.337
17	1.333
18	1.330
19	1.328
20	1.325
21	1.323
22	1.321
23	1.319
24	1.318
25	1.316
26	1.315
27	1.314
28	1.313
29	1.311
30	1.310
40	1.303
60	1.296
120	1.289
∞	1.282

[a]Degrees of freedom (df) are equal to the number of samples (n) collected from a solid waste less one.

[b]Tabulated "t" values are for a two-tailed confidence interval and a probability of 0.80 (the same values are applicable to a one-tailed confidence interval and a probability of 0.90).

restrictive, it can be shown that even nonnormal populations possessing bell-shaped distributions can be closely approximated by a t distribution. From the preliminary study n = 4, and the degrees of freedom, n-1, is 3. Therefore,

$$t_{0.80} = 1.638$$

(d) The appropriate number of sludge samples to be collected from the discharge pipe is

$$n = t^2_{0.80}s^2/d^2 = \frac{(1.638^2)(65.00)}{5.50^2} = 5.77,$$

or six. That number of samples (plus extra for protection against poor preliminary estimates of $\overline{X}$ and s^2) is collected from the pipe by a simple random process.

6.7 The sampling plan should include quality assurance procedures. At the least, this should include the following:

- Sample handling quality control by carrying a QC sample of known concentration through all of the sampling and analytical steps; and
- Analytical quality control with duplicate analyses, spike recovery, and analysis of certified standards. Most analytical laboratories should have their own internal quality control procedures.

More rigorous quality control/quality assurance procedures may be required depending on the particular goals of the sampling program.[7]

[7]Further information on quality control/quality assurance can be found in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, U.S. Environmental Protection Agency, 1982.

Practice A - Liquid or Slurry Discharges

7. Apparatus

7.1 Dipper Sampler--For slurry and liquid discharges a dipper type sampler should be employed. This type of sampler is depicted in Figure 1. The dipper can be varied in size depending on the flow rate from the pipe or sluiceway. For high flow velocities (>100 gallons per minute) problems will arise in physically holding the dipper in the stream.

8. Sampling Procedure

8.1 Clean the beaker appropriate for the analysis to be performed and the container to hold the composite samples. Cleaning the equipment is especially important to prevent cross-contamination between different waste types. It may be necessary to dedicate equipment to specific waste types or strata.

8.2 Assemble the sampler by clamping the beaker to the pole.

8.3 Pass the dipper in one sweeping motion through the discharge stream at a rate such that the dipper is filled in one pass. Make enough passes to cover the entire cross sectional area of the discharge stream.

8.4 If compositing of samples is to be performed it is preferable and sometimes necessary to have the laboratory mix the sample. Depending on the type of analysis to be conducted, drying the sample or slurrying with distilled water may be possible in the laboratory to facilitate mixing. The laboratory personnel are better able and equipped to make such decisions and determine what effect such procedures would have on the analysis. If the composite has not been appropriately mixed prior to shipment, this should be clearly indicated on the sample label.

8.5 Preservation techniques appropriate for the analyses or testing to be conducted should be used.

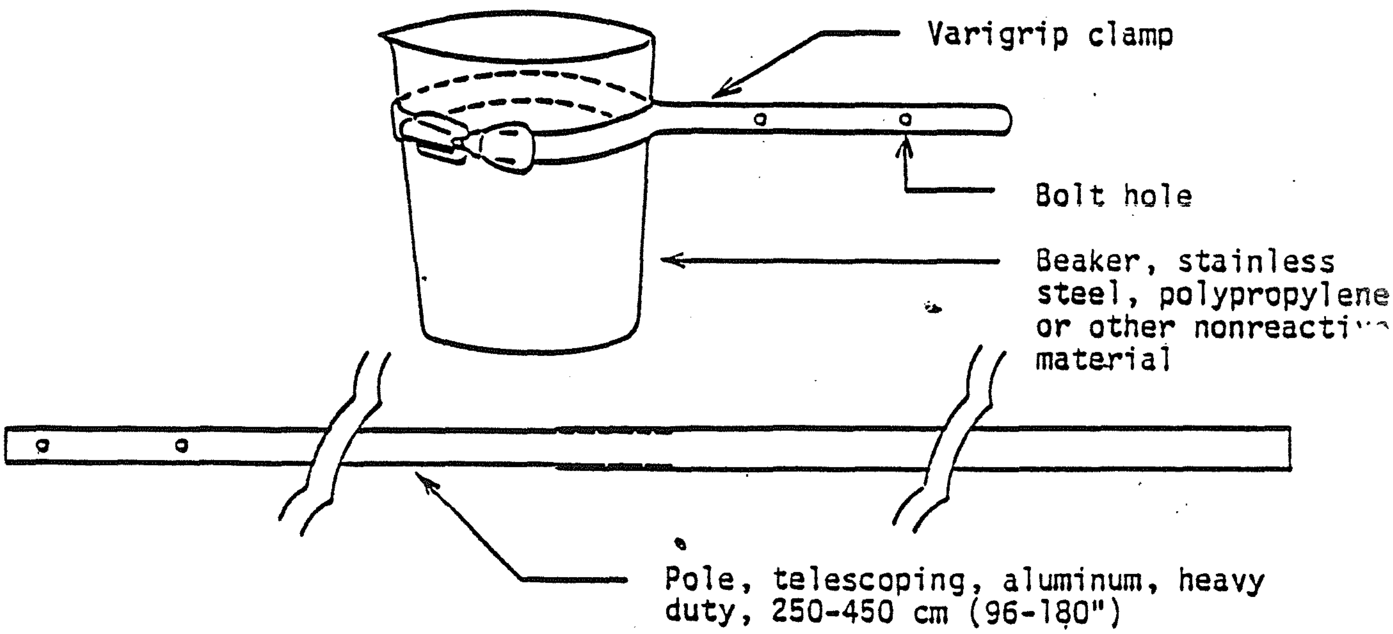


Figure 1. Dipper Sampler (Source: Test Methods for Evaluating Solid Wastes, U.S. EPA, SW-846, July 1982)

9. Sample Labeling and Shipping

9.1 An indelible label should be secured to the container identifying the sample. The label should contain or reference the following information.

9.1.1 Name and location of site.

9.1.2 Date and time of sampling.

9.1.3 Location of sampling.

9.1.4 Sample number.

9.1.5 Description and disposition of sample.

9.1.6 Name of sampling personnel.

9.1.7 Full weight of sample and container upon shipping.

9.1.8 Type of preservative.

9.1.9 Sampling conditions, analytical requirements.

9.2 Pack the sample container securely in a shipping container. If required for analysis, the sample container should be packed in ice and cooled to 4°C. A min-max thermometer should be packed with the samples.

9.3 Follow DOT (Department of Transportation) shipping regulations.

9.4 Make arrangements for handling, logging in, adequate storage and analysis of the sample at its destination. If warranted, follow chain of custody protocol.

Practice B - Solid or Semi-Solid Discharges

10. Apparatus

10.1 Scoop or Shovel Sampler--For solid or solid-like discharges from belts, a scoop or shovel should be used. Where routine sampling is to be performed, a scoop may be designed to match the width and contour of the belt. In this way, a single time increment sample may be taken in one scoop.

11. Sampling Procedure

11.1 Clean the scoop or shovel as appropriate for the desired chemical analysis to prevent cross-contamination. In some cases, it may be necessary to dedicate equipment to specific waste types or waste strata.

11.2 Sample at a convenient point along the belt.

11.3 Sample the waste with the scoop or shovel making sure to sample across the entire width of the belt. Be sure all fines and any liquid are also included in the scooped sample.

11.4 Repeat sampling depending on the uniformity of the waste. Composite the grab samples and transfer a well mixed portion to a glass or polyethylene container and seal. It is preferable and sometimes necessary to have the laboratory mix the sample. Depending on the type of analysis to be conducted, drying the sample or slurrying with distilled water may be possible in the laboratory to facilitate mixing. The laboratory personnel are better able and equipped to make such decisions and determine what effect such procedures would have on the analysis.

11.5 If composite has not been appropriately mixed prior to shipment, this should be clearly indicated on the sample label.

12. Sample Labeling and Shipping

12.1 Refer to Section 9.

APPENDIX

I. THE LILLIEFORS TEST FOR GOODNESS OF FIT

I.1.

The data consist of a random sample $X_1, X_2, \ldots, X_n$ of size n associated with some unknown distribution function, denoted by F(x). Compute the sample mean

$$\overline{X} = \frac{1}{n}\sum_{i=1}^{n} X_i \qquad (1)$$

for use as an estimate of μ, and compute

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(X_i - \overline{X})^2} \qquad (2)$$

as an estimate of σ. Then compute the "normalized" sample values Z_i, defined by

$$Z_i = \frac{X_i - \overline{X}}{s} \quad i = 1,2,\ldots,n \qquad (3)$$

The test statistic is computed from the Z_i's instead of from the original random sample.

Assumptions

1. The sample is a random sample.

Hypotheses

H_0: The random sample has the normal distribution, with unspecified mean and variance.

H_1: The distribution function of the X_i's is nonnormal.

Test Statistic. Ordinarily the test statistic is the usual two-sided Kolmogorov test statistic, defined as the maximum vertical distance between the empirical distribution function of the X_i's and the normal distribution function with mean $\overline{X}$ and standard deviation s, as given by (1) and (2). However, the following method of computing the test statistic is slightly easier, and is equivalent to the method indicated above.

Draw a graph of the standard normal distribution function, and call it $F^*(x)$. Table I.1 may be of assistance. Also draw a graph of the empirical distribution function of the normalized sample, the Z_i's defined by Equation (3), using the same set of coordinates as was used above for $F^*(x)$. Find the maximum vertical distance between the two graphs, $F^*(x)$ and the empirical distribution function which we shall call $S(x)$. This distance is the test statistic. That is, the Lilliefors test statistic T_2 is defined by

$$T_2 = \sup_x |F^*(x) - S(x)| \tag{4}$$

Decision Rule. Reject H_0 at the approximate level of significance α if T_2 exceeds the $1 - \alpha$ quantile as given in Table I.2.

TABLE I.1. NORMAL DISTRIBUTION*

w_p	p	w_p	p	w_p	p
-3.7190	.0001	-.4677	.32	.5244	.70
-3.2905	.0005	-.4399	.33	.5534	.71
-3.0902	.001	-.4125	.34	.5828	.72
-2.5758	.005	-.3853	.35	.6128	.73
-2.3263	.01	-.3585	.36	.6433	.74
-2.1701	.015	-.3319	.37	.6745	.75
-2.0537	.02	-.3055	.38	.7063	.76
-1.9600	.025	-.2793	.39	.7388	.77
-1.8808	.03	-.2533	.40	.7722	.78
-1.7507	.04	-.2275	.41	.8064	.79
-1.6449	.05	-.2019	.42	.8416	.80
-1.5548	.06	-.1764	.43	.8779	.81
-1.4758	.07	-.1510	.44	.9154	.82
-1.4395	.075	-.1257	.45	.9542	.83
-1.4051	.08	-.1004	.46	.9945	.84
-1.3408	.09	-.0753	.47	1.0364	.85
-1.2816	.10	-.0502	.48	1.0803	.86
-1.2265	.11	-.0251	.49	1.1264	.87
-1.1750	.12	.0000	.50	1.1750	.88
-1.1264	.13	.0251	.51	1.2265	.89
-1.0803	.14	.0502	.52	1.2816	.90
-1.0364	.15	.0753	.53	1.3408	.91
-.9945	.16	.1004	.54	1.4051	.92
-.9542	.17	.1257	.55	1.4395	.925
-.9154	.18	.1510	.56	1.4758	.93
-.8779	.19	.1764	.57	1.5548	.94
-.8416	.20	.2019	.58	1.6449	.95
-.8064	.21	.2275	.59	1.7507	.96
-.7722	.22	.2533	.60	1.8808	.97
-.7388	.23	.2793	.61	1.9600	.975
-.7063	.24	.3055	.62	2.0537	.98
-.6745	.25	.3319	.63	2.1701	.985
-.6433	.26	.3585	.64	2.3263	.99
-.6128	.27	.3853	.65	2.5758	.995
-.5828	.28	.4125	.66	3.0902	.999
-.5534	.29	.4399	.67	3.2905	.9995
-.5244	.30	.4677	.68	3.7190	.9999
-.4959	.31	.4959	.69		

Source: Abridged from Tables 3 and 4, pp. 111-112, Pearson and Hartley (1962).

*The entries in this table are quantiles w_p of the standard normal random variable W, selected so $P(W \leq w_p) = p$ and $P(W > w_p) = 1 - p$.

TABLE I.2. QUANTILES OF THE LILLIEFORS TEST STATISTIC*

	p=.80	.85	.90	.95	.99
Sample size n = 4	.300	.319	.352	.381	.417
5	.285	.299	.315	.337	.405
6	.265	.277	.294	.319	.364
7	.247	.258	.276	.300	.348
8	.233	.244	.261	.285	.331
9	.223	.233	.249	.271	.311
10	.215	.224	.239	.258	.294
11	.206	.217	.230	.249	.284
12	.199	.212	.223	.242	.275
13	.190	.202	.214	.234	.268
14	.183	.194	.207	.227	.261
15	.177	.187	.201	.220	.257
16	.173	.182	.195	.213	.250
17	.169	.177	.189	.206	.245
18	.166	.173	.184	.200	.239
19	.163	.169	.179	.195	.235
20	.160	.166	.174	.190	.231
25	.142	.147	.158	.173	.200
30	.131	.136	.144	.161	.187
Over 30	$\frac{.736}{\sqrt{n}}$	$\frac{.768}{\sqrt{n}}$	$\frac{.805}{\sqrt{n}}$	$\frac{.886}{\sqrt{n}}$	$\frac{1.031}{\sqrt{n}}$

Source: Adapted from Table 1 of Lilliefors (1967), with corrections.
*The entries in this table are the approximate quantiles w_p of the Lilliefors test statistic T_2. Reject H_0 at the level α if T_2 exceeds $w_{1-\alpha}$ for the particular sample size n.

I.2.

The same data used to calculate n, the number of samples required, in Section 6 will be used to illustrate the Lilliefors test.

Barium levels in four sludge samples were 86, 90, 98 and 104 ppm. The sample values, X_i, are arranged from smallest to largest, and converted to Z_i by subtracting $\overline{X} = 94.50$, and dividing by $S = \sqrt{65.00} = 8.06$.

X_i	Z_i
86	-1.05
90	-0.56
98	0.43
104	1.18

The null hypothesis of normality is tested with the Lilliefors test statistic

$$T_2 = \sup_x |F^*(x) - S(x)|$$

where $F^*(x)$ is the standard normal distribution function and $S(x)$ is the empirical distribution function of the Z_i's. Figure I.1 shows the curves representing $F^*(x)$ (generated from Table I.1) and $S(x)$. The maximum vertical distance between $F^*(x)$ and $S(x)$ is seen from Figure I.1 to occur at $x = -1.05$, where $S(x)$ equals 0 and $F^*(x)$ equals 0.15, and so T_2 equals 0.15.

The Lilliefors test calls for rejection of H_0 at $\alpha = .05$ if T_2 exceeds its .95 quantile, which is given in Table I.2 as

$$W_{.95} = \frac{.381}{\sqrt{n}} = \frac{.381}{\sqrt{4}} = 0.19$$

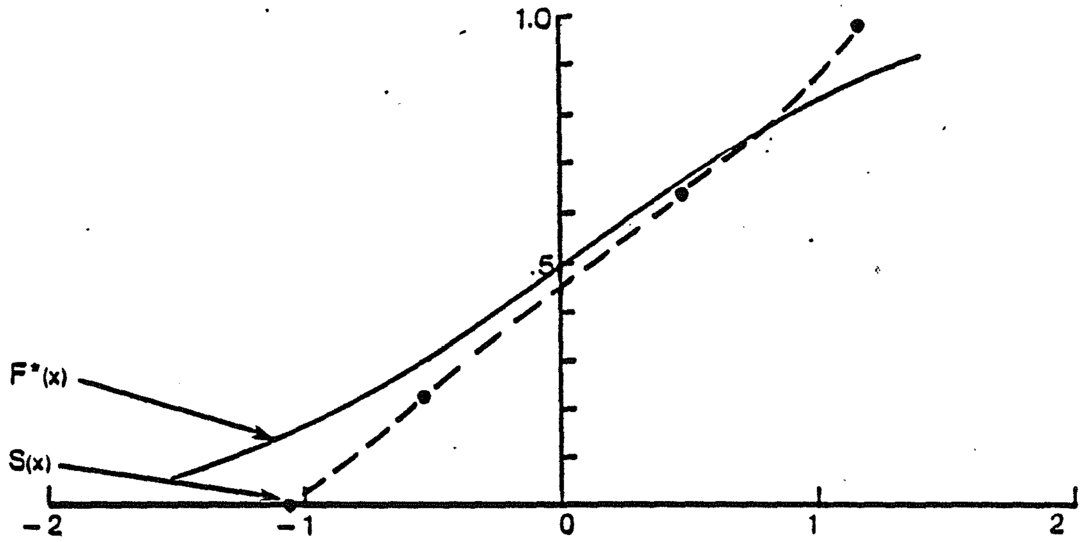


Figure I.1. Graphs of F*(x) and S(x) from Example

Because T_2 equals 0.15, and is less than 0.19, the null hypothesis is accepted. This means that the normal distribution is a reasonable approximation of the true unknown distribution.

APPENDIX C

EPA Required Containers, Preservation Techniques, and Holding Times

Measurement Table/Parameter		Container[1]	Preservative[2,3]	Maximum Holding Time[4]
IA	**Bacterial Tests**			
1-4,	Coliform, fecal and total	P,G	Cool, 4^oC 0.008% $Na_2S_2O_3$[5]	6 hours
5.	Fecal streptococci	P,G	Cool, 4^oC 0.008% $Na_2S_2O_2$[5]	6 hours
IB	**Inorganic Tests**			
1.	Acidity	P,G	Cool, 4^oC	14 days
2.	Alkalinity	P,G	Cool, 4^oC	14 days
4.	Ammonia	P,G	Cool, 4^oC H_2SO_4 to $pH < 2$	28 days
9.	Biochemical oxygen demand	P,G	Cool, 4^oC	48 hours
10.	Biochemical oxygen demand, carbonaceous	P,G	Cool, 4^oC	48 hours
12.	Bromide	P,G	None required	28 days
15.	Chemical oxygen demand	P,G	Cool, 4^oC H_2SO_4 to $pH < 2$	28 days

EPA Required Containers, Preservation Techniques, and Holding Times

Measurement Table/Parameter	Container[1]	Preservative[2,3]	Maximum Holding Time[4]
IB (Con't) Inorganic Tests			
16. Chloride	P,G,	None required	28 days
17. Chlorine, total residual	P,G,	None required	Analyze immediately
21. Color	P,G	Cool, 4°C	48 hours
23-24. Cyanide, total and amenable to chlorination	P,G	Cool, 4°C NaOH to pH > 12 0.6g ascorbic acid[5]	14 days[6]
25. Fluoride	P	None required	28 days
27. Hardness	P,G	HNO_3 to pH <2	6 months
28. Hydrogen ion (pH)	P,G	None required	Analyze immediately
31,43. Kjeldahl and organic Nitrogen	P,G	Cool, 4°C H_2SO_4 to pH< 2	28 days
Metals[7]			
18. Chromium VI	P,G	Cool, 4°C	24 hours
35. Mercury	P,G	HNO_3 to pH <2	28 days

EPA Required Containers, Preservation Techniques, and Holding Times

Measurement Table/Parameter			Container[1]	Preservative[2,3]	Maximum Holding Time[4]
IB (Con't)	3, 5-8, 11, 13, 14, 19, 20, 22, 26 29, 30, 32-34, 36, 37, 45, 47, 51, 52, 58, 59, 60, 62, 63, 70-72, 74, 75.	Metals, except above	P,G	HNO_3 to pH <2	6 Months
	38.	Nitrate	P,G	Cool, 4^oC	48 hours
	39.	Nitrate-nitrite	P,G	Cool, 4^oC H_2SO_4 to pH <2	28 days
	40.	Nitrite	P,G	Cool, 4^oC	48 hours
	41.	Oil and grease	G	Cool, 4^oC H_2SO_4 to pH <2	28 days
	42.	Organic carbon	P,G	Cool, 4^oC HCl or H_2SO_4 to pH< 2	28 days
	44.	Orthophosphate	P,G	Filter immediately Cool, 4^oC	48 hours

EPA Required Containers, Preservation Techniques, and Holding Times

Measurement Table/Parameter			Container[1]	Preservative[2,3]	Maximum Holding Time[4]
IB (Con't)	46.	Oxygen, Dissolved Probe	G Bottle and top	None required	Analyze immediately
		Winkler	G bottle and top	Fix on site and store in dark	8 hours
	48.	Phenols	G only	Cool, 4°C H_2SO_4 to pH <2	28 days
	49.	Phosphorus (elemental)	G	Cool, 4°C	48 hours
	50.	Phosphorus, total	P,G	Cool, 4°C H_2SO_4 to pH <2	28 days
	53.	Residue, total	P,G	Cool, 4°C	7 days
	54.	Residue, Filterable	P,G	Cool, 4°C	7 days
	55.	Residue, Non-filterable (TSS)	P,G	Cool, 4°C	7 days
	56.	Residue, settleable	P,G	Cool, 4°C	48 hours
	57.	Residue, volatile	P,G	Cool, 4°C	7 days

EPA Required Containers, Preservation Techniques, and Holding Times

Measurement Table/Parameter			Container[1]	Preservative[2,3]	Maximum Holding Time[4]
IB (Con't)	61.	Silica	P	Cool, 4°C	28 days
	64.	Specific conductance	P,G	Cool, 4°C	28 days
	65.	Sulfate	P,G	Cool, 4°C	28 days
	66.	Sulfide	P,G	Cool, 4°C, add zinc acetate plus sodium hydroxide to pH > 9	7 days
	67.	Sulfite	P,G	None required	Analyze immediately
	68.	Surfactants	P,G	Cool, 4°C	48 hours
	69.	Temperature	P,G	None required	Analyze immediately
	73.	Turbidity	P,G	Cool, 4°C	48 hours

EPA Required Containers, Preservation Techniques, and Holding Times

Measurement Table/Parameter		Container[1]	Preservative[2,3]	Maximum Holding Time[4]
1C	Organic Tests[8]			
13, 19, 20, 21, 23, 25, 26, 27, 28, 29, 35, 36, 37, 38, 40, 41, 42, 43, 44, 46, 47, 48, 57, 67, 88, 89, 92, 93, 94, 95, 97.	Purgeable halocarbons	G, Teflon-lined septum	Cool, $4^{\circ}C$ 0.008% $Na_2S_2O_3$[5]	14 days
6, 58, 90	Purgeable aromatics	G, Teflon-lined septum	Cool, $4^{\circ}C$ 0.008% $Na_2S_2O_3$[5] HCl to pH< 2[9]	14 days
3, 4.	Acrolein and acrylonitrile	G, Teflon-lined septum	Cool, $4^{\circ}C$ 0.008% $Na_2S_2O_3$[5] Adjust pH to 4-5[10]	14 days
24, 31, 45, 50, 54, 68, 71, 72, 83, 85, 96.	Phenols[11]	G, Teflon-lined cap	Cool, $4^{\circ}C$ 0.008% $Na_2S_2O_3$[5]	7 days until extraction, 40 days after extraction

EPA Required Containers, Preservation Techniques, and Holding Times

Measurement Table/Parameter		Container[1]	Preservative[2,3]	Maximum Holding Time[4]
IC (Con't) 7, 39.	Benzidines[11]	G, Teflon-lined cap	Cool, 4°C 0.008% $Na_2S_2O_3$[5] pH 2-7[12]	7 days until extraction[13]
14, 18, 49, 51, 52, 53.	Phthalate esters[11]	G, Teflon-lined cap	Cool, 4°C	7 days until extraction; 40 days after ex.
73, 74, 75	Nitrosamines[11,14]	G, Teflon-lined cap	Cool, 4°C store in dark 0.008% $Na_2S_2O_3$[5]	7 days " " " " " " " "
76, 77, 78, 79, 80, 81, 82	PCBs[11]	G, Teflon-lined cap	Cool 4°C	7 Days " " " " " " " "
55, 56, 66, 70	Nitroaromatics and isophorone[11]	G, Teflon-lined cap	Cool, 4°C	7 days " " " " " " " "
1, 2, 5, 8, 9, 10, 11, 12, 33, 34, 59, 60, 65, 69, 84, 86	Polynuclear aromatic hydrocarbons[11]	G, Teflon-lined cap	Cool, 4°C 0.008% $Na_2S_2O_3$[5] store in dark	7 days " " " " " " " "
15, 16, 17, 22, 32	Haloethers[11]	G, Teflon-lined cap	Cool, 4°C 0.008% $Na_2S_2O_3$[5]	7 Days " " " " " " " "

EPA Required Containers, Preservation Techniques, and Holding Times

Measurement Table/Parameter		Container[1]	Preservative[2,3]	Maximum Holding Time[4]
IC (Con't)				
30, 36, 37, 38, 61, 62, 63, 64 91	Chlorinated hydrocarbons[11]	G, Teflon-cap	Cool, 4°C	7 days until extraction, 40 days after extraction
87	TCDD[11]	G, Teflon-cap	Cool, 4°C 0.008% $Na_2S_2O_3$[5]	7 days " " " " " " " "
ID	Pesticides Tests			
1-70.	Pesticides[11]	G, Teflon-lined cap	Cool, 4°C pH 5-9[15]	7 days " " " " " " " "
IE	Radiological Tests			
1-5.	Alpha, beta and radium	P,G	HNO_3 to pH < 2	6 months

Notes

1. Polyethylene (P) or Glass (G).
2. Sample preservation should be performed immediately upon sample collection. For composite samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.
3. When any sample is to be shipped by common carrier or sent through the United States Mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person Offering such material for transportation is responsible for ensuring such compliance. For the preservation requirements of Table II, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCL) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); and Sodium hydroxide (NaOH) in weight or less (pH about 12.30 or less).

4. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of samples under study are stable for the longer time, and has received a variance from the Regional Administrator. Some samples may not be stable for the maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for a shorter time if knowledge exists to show this is necessary to maintain sample stability. See § 136.3(e) for details.

5. Should only be used in the presence of residual chlorine.

6. Maximum holding time is 24 hours when sulfide is present. Optionally, all samples may be tested with lead acetate paper before the pH adjustm in order to determine if sulfide is present. If sulfide is present, it can be removed by the addition of cadmium nitrate powder until a negati spot test is obtained. The sample is filtered and then NaOH is added to pH 12.

7. Samples should be filtered immediately on-site before adding preservative for dissolved metals.

8. Guidance applies to samples to be analyzed by GC, LC, or GC/MS for specific compounds.

9. Sample receiving no pH adjustment must be analyzed within seven days of sampling.

10. The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment must be analyzed within 3 days of sampling.

11. When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for optimum safeguard of sample integrity. When the analytes of concern fall within two or more chemical categories, the sample may be preserved by cooling to 4°C, reducing residual chlorine with 0.008% sodium thiosulfate, storing in the dark, and adjusting the pH to 6-9; samples preserved in this manner may be held for seven days before extraction and for forty days after extraction. Exceptions to this optional preservation and holding time procedure are noted in footnote 6 (re the requirement for thiosulfate reduction of residual chlorine), and footnotes 13, 14 (re the analysis of benzidine).

12. If 1,2-diphenylhydrazine is likely to be present, adjust the pH of the sample to 4.0 ± 0.2 to prevent rearrangement to benzidine.

13. Extracts may be stored up to 7 days before analysis if storage is conducted under an inert (oxidant-free) atmosphere.

14. For the analysis of diphenylnitrosamine, add 0.008% $Na_2S_2O_3$ and adjust pH to 7-10 with NaOH within 24 hours of sampling.

15. The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin, add 0.008% $Na_2S_2O_3$.

TEST	SAMPLE SIZE	CONTAINER TYPE	SAMPLE LIFE
VOA In Water	40 ML	40 ML VOA Vial	7 Day
Fish	250 to 500 gram filleted & frozen	Wrapped in aluminum foil ship frozen	N/A
Pure Reference* material	30 - 60 ML	Glass Vial	N/A
Priority Pollutants (1 & 2)	2(½ gallon) + 40 ML	½ gallon glass + 40 ML VOA Vial	7 Day
Solids & semi solids* for pesticides, PCB's, herbicides, etc.	500 ML	French Square	N/A
Water for pesticides,* PCB's, herbicides, etc.	½ gallon	½ gallon glass	N/A
Waste oil for * hazardous material or volatile organics	30 - 60 ML	Glass Vial	N/A

*NOTE: Toxic and/or hazardous materials must be shipped per memo from Floyd D. Kefford dated March 6, 1981.

1. For inorganic analyses four (4) 500 ML are required, 1 fixed for Cyanide, 1 fixed for phenol, 1 fixed for metals, and 1 with nothing added.

2. Refrigerate at 4°C.

Sample bottles supplied by the laboratory are solvent rinsed and must be used for samples requiring organic analyses.

If you have questions on sampling call:

Department of Environmental Resources
Bureau of Laboratories
Evan Press Building 3rd & Reilly Streets
Harrisburg, Pennsylvania 17120
717/787-4669