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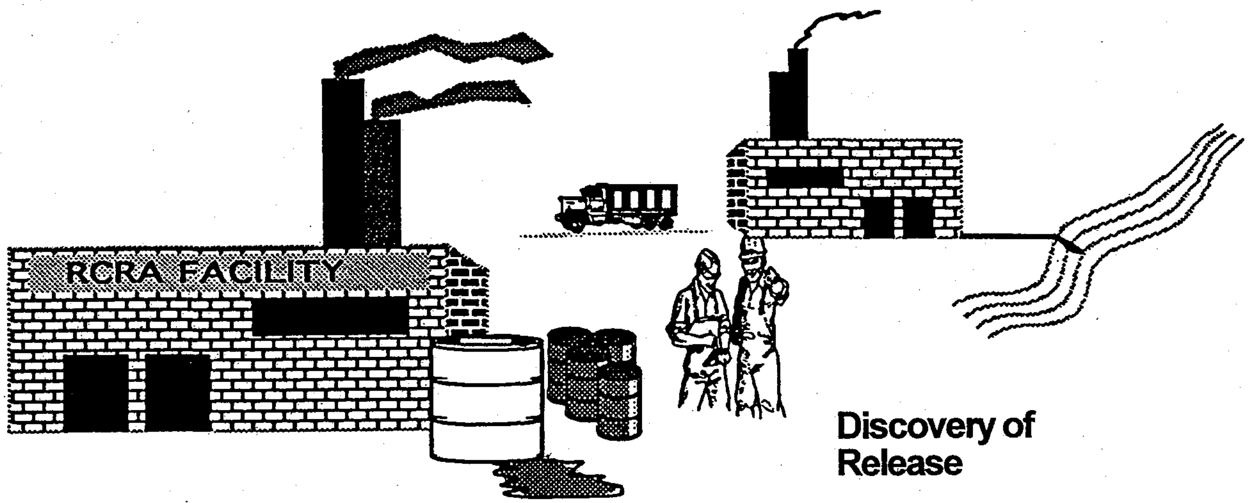

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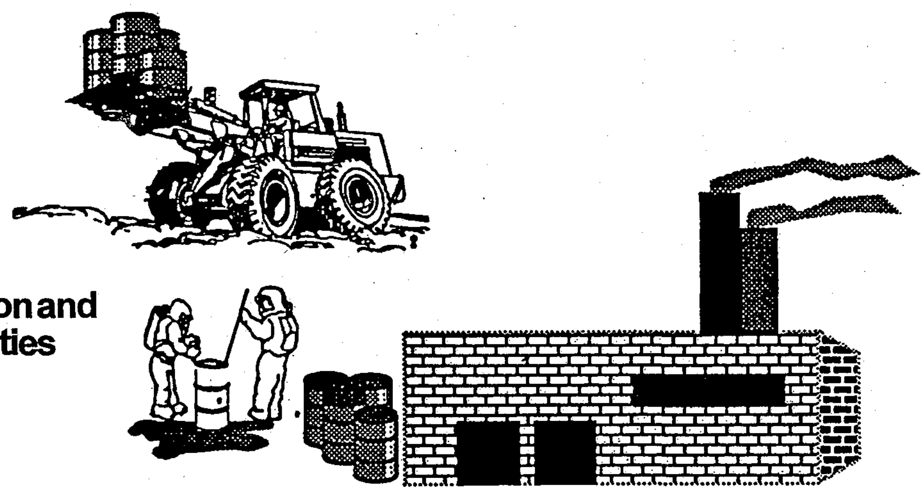

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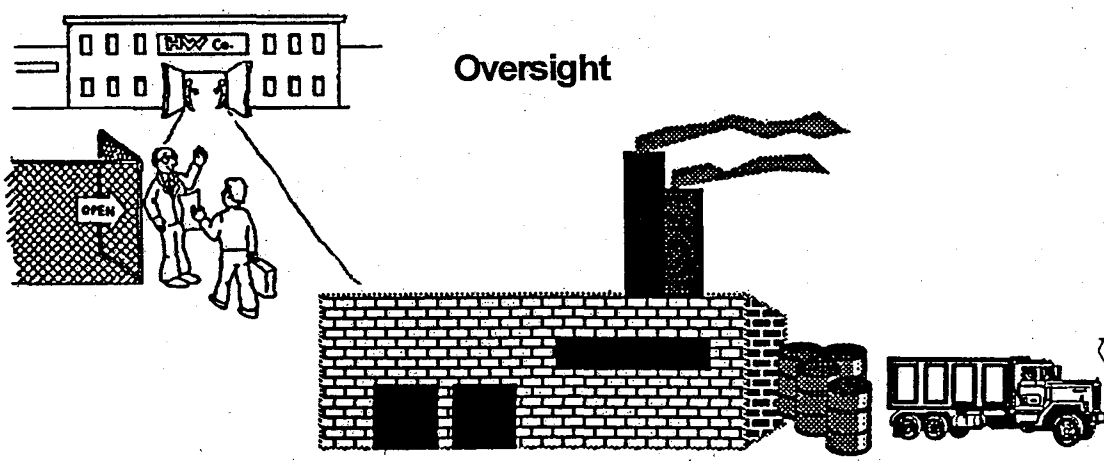

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RCRA CORRECTIVE ACTION INSPECTION GUIDANCE MANUAL

(FINAL)
MAY 1995

Office of Site Remediation Enforcement

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Foreword

This document was issued by the Office of Site Remediation Enforcement (OSRE) in May, 1995 as the Corrective Action Inspection Guidance (Final). All ten Regions and various authorized States reviewed and commented on this document.

The purpose of this guidance this guidance is to delineate inspection activities which are critical for the successful completion of corrective action activities currently underway at many facilities. This guidance is intended to supplement the RCRA Inspection Manual (OSWER 9938.2b October 1993) as amended.

There are various reasons for conducting a corrective action inspection. First, the corrective action report will inform the project manager (state or regional) of a facility's field progress. Second, the corrective action inspection will help to accelerate the return to compliance of facilities that failed to adhere to the terms and schedules contained in corrective action orders and permit conditions, workplans (IM/Stabilization, RFI/CMS, CMI), bimonthly reports, etc. Finally, an inspection documenting a facility's failure to adhere to the schedules and terms may trigger enforcement actions, including stipulated penalties.

The main text of the document provides pre-inspection and post-inspection procedures for performing corrective action inspections and technical guidance on evaluating compliance with corrective orders and permit conditions during the following four phases of the corrective action program:

- **Interim/Stabilization Measures (ISMs)**
- **RCRA Facility Investigation (RFI)**
- **Corrective Measure Study (CMS)**
- **Corrective Measure Implementation (CMI)**

The scope of oversight and attendant information requirements can be different at EPA or State levels. This document is intended as "**guidance only**" and all or parts of this document can be utilized as appropriate to a given situation. The approaches outlined for a conducting corrective action inspection are **only suggestions**. Enforcement personnel should consider the material and adopt relevant portions for their own use.

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF GUIDANCE

This guidance manual has been written for inspectors from the U.S. Environmental Protection Agency (EPA) and State environmental agencies (or their respective contractors) who will be conducting field oversight of owner/operator activities at hazardous waste facilities regulated under the Resource Conservation and Recovery Act (RCRA) and undergoing corrective action. Although the text uses the term "inspectors," many other EPA and State personnel, such as permit writers and enforcement personnel, should find this guidance manual useful. Below Table 1-1 describes the different types of corrective action inspections.

TABLE 1-1

Types of Inspections	Description
Interim/Stabilization Measures	Inspection of actions to control threats to human health or the environment from releases and/or to prevent the further spread of contamination, while longterm remedies are pursued.
RCRA Facility Investigation	Inspection of activities performed by the owner/operator to characterize the nature and extent of releases at the facility and identify actual or potential receptors.
Corrective Measures Study	Inspection of activities performed by the owner/operator to evaluate corrective measure alternative(s) to address releases at the facility.
Corrective Measures Implementation	Inspection of activities performed by the owner/operator involving the design, construction, implementation and monitoring of corrective measures.

1.2 THE CORRECTIVE ACTION PROGRAM

Congress enacted RCRA in 1976 to provide EPA with authority to regulate the generation, transportation, treatment, storage, and disposal of hazardous waste, and to provide EPA with mechanisms to enforce the regulations. EPA initially promulgated regulations regarding the management of hazardous wastes in May 1980. Although these regulations and subsequent additions to them placed stringent controls on the generation, transportation, treatment, storage, and disposal of hazardous waste, regulations did not address all releases of hazardous wastes or hazardous constituents from the facilities that treat, store, or dispose of hazardous waste.

To address this problem, Congress amended RCRA by enacting the Hazardous and Solid Waste Amendments of 1984 (HSWA) which provided EPA with authorities for addressing releases of hazardous wastes or hazardous constituents at interim status facilities or facilities obtaining permits. The goal of this new corrective action program was to provide for timely response to address releases of hazardous wastes or hazardous constituents from treatment, storage, and disposal facilities (TSDFs) that may pose a threat to human health and the environment. Section 3008(h) allows EPA to issue orders to address releases from TSDFs authorized to operate under interim status[1]. Section 3004(u) of RCRA gives EPA the authority to address on-site releases from Solid Waste Management Units (SWMUs) at TSDFs by specifying conditions in a facility's permit. This section also requires such permits to include provisions for assurance of financial responsibility for completing corrective action. Section 3004(v) of RCRA provides EPA with the authority to require owners or operators to address off-site releases from TSDFs. Section 3005 (c)(3) of RCRA and 40 C.F.R. § 270.32(b)(2) allows EPA to require corrective action from non-SWMUs, as necessary to protect human health and the environment in permits. Section 7003 of RCRA allows EPA to order any person contributing to a release to undertake necessary actions when the release may present an imminent and substantial endangerment to human health or the environment. This order can be used against any contributing party, including past or present generators, transporters, or owner/operators of the facility. Section 3013 of RCRA allows EPA to issue an order to a facility owner/operator to evaluate the nature and extent of a release through monitoring, analysis, and testing when a substantial hazard to human health or the environment

[1] Facilities subject to interim status are those authorized to operate under Section 3005(e) of RCRA.

exists. Section 3007 of RCRA allows EPA, an authorized State, or a representative of either of these to enter any premises where hazardous waste is handled to examine records and take samples of the waste.

1.2.1 Implementation of the Corrective Action Program

The RCRA corrective action program established by EPA generally consists of four phases: (1) evaluate whether there has been a release to environmental media, (2) investigate the nature and extent of release (3) evaluate and determine appropriate corrective measures, and (4) implement corrective measures. The four-phase cleanup process for the RCRA corrective action program include the following: 1) RCRA Facility Assessment (RFA), 2) RCRA Facility Investigation (RFI), 3) Corrective Measure Study (CMS), and 4) Corrective Measure Implementation (CMI).

In addition, EPA may require, at any time during the corrective action process, the owner/operators to conduct interim/stabilization measures (ISMs). ISMs are used to control threats to human health or the environment from releases and/or prevent the further spread of contamination, while longterm remedies are pursued.

Intially, EPA or an authorized state can conduct a RCRA Facility Assessment (RFA) at facilities to determine whether there is any threat to human health or the environment. The purpose of the RFA is to: 1) identify and evaluate SWMUs and other areas of concern for releases to all media and 2) determine the need for further investigation and/or interim measures. Once EPA or the authorized state determines the need for corrective action at a facility, EPA or an authorized state will initiate corrective action at the facility in one of two ways: 1) through a corrective action order, 2) or through permit conditions pursuant to RCRA Section 3004(u) and (v) and/or 3005(c)(3). A corrective action order incorporates specific language that generally requires the owner/operator to conduct a RCRA Facility Investigation (RFI) to determine the nature and extent of contamination and, if needed, to conduct a Corrective Measure Study (CMS) to evaluate various cleanup alternatives. Once the CMS has been completed, EPA or authorized State selects a corrective measure to be implemented at the facility and issues a Corrective Measure Implementation (CMI) order that requires the owner/operator to implement the selected corrective measure[2]. For corrective action implemented through a permit, EPA Regional or authorized State permit writers develop permit conditions that specify corrective action for releases that occur over the life of the permit. The permit contains compliance schedules requiring the owner or operator to conduct an RFI and, if necessary, a CMS. Once the CMS is completed, EPA or the authorized state selects a corrective measure(s) to be implemented at the facility. EPA or the State then modifies the facility's permit to require a CMI.

> ***Public Participation in the Corrective Action Process.*** The Corrective Action Program enables the public to gather information and ask questions during the corrective action process. In addition, the public is given the opportunity to comment on the Statement of Basis (SB)[3] and, where applicable, the draft permit modification which presents the regulatory agency's proposed remedy for a facility. Following receipt of public comments, the regulatory agency prepares a Final Decision and Response to Comments (RTC), in which the Agency responds to public comments and documents the selected remedy and the rationale for selection.

1.3 STATE AUTHORIZATION FOR CORRECTIVE ACTION

Under RCRA Section 3006(g) (as amended by HSWA), EPA may authorize States to implement corrective action if a State demonstrates that its program is equivalent to or more stringent then the Federal program. Once a State is authorized for corrective action, the appropriate State corrective action authorities and regulations are used in lieu of Federal requirements to enforce investigations and necessary corrective action. The State then has authority for corrective action in authorized States although the memorandum of agreement (MOA) between EPA and the State may provide for EPA participation or input. States are not currently able to be authorized for RCRA Section 3008(h), however, the agency is considering including such authority as part of the authorized State program. Inspectors can call the RCRA/Superfund Hotline at 1-800-424-9346 to receive information on which States have been authorized for corrective action or can obtain this information within their own regions.

---

[2] Sometimes the CMI is incorporated into the orginial RFI/CMS/CMI 3008(h) order.

[3] The Statement of Basis document is a public document which describes the proposed remedy, but does not select the final remedy for a facility. This approach allows for additional information to be considered during the public comment period.

For more information on the implementation of the corrective action program, inspectors should refer to Appendix A, which provides a general listing of documentation available for information on the corrective action program. For general information regarding an inspector's authorities and limitations, how to handle confidential information, ethical considerations, conflicts of interest, etc., inspectors should refer to the RCRA Inspection Manual, October 1993.

1.4 SUMMARY

In performing their job, Corrective Action (CA) inspectors must keep in mind a number of considerations:

- The purpose of the RCRA CA program
- Types of CA inspections
- Current regulations and guidance documents available
- Permit and enforcement tools available to compel corrective action

2.0 PREPARING FOR CORRECTIVE ACTION INSPECTIONS

The outline below presents an overview of the key steps in corrective action inspection preparation. The procedures involved in each of these steps are discussed in the following guidance manual sections.

	Guidance Manual Section	Key Steps
2.1	DEFINE PURPOSE AND SCOPE OF INSPECTION	• Determine inspection objectives • Determine CA activity being conducted by owner/operator. • Identify specific resources necessary to conduct on-site inspection
	↓	
2.2	ASSEMBLE INSPECTION TEAM	• Contact Project Officer, identify any interested offices or other agencies • Identify level of technical expertise required • Identify individual(s) to conduct inspection
	↓	
2.3	REVIEW BACKGROUND INFORMATION	• Review corrective action orders or corrective action provisions in permit, approved workplans, and other background material from files
	↓	
2.4	DEVELOP FACILITY-SPECIFIC INSPECTION PLAN AND CHECKLIST	• Develop facility-specific corrective action inspection plan, with step-by-step procedures for carrying out inspection, including the following: (1) preinspection preparation; (2) on-site inspection requirements; (3) health and safety plan; and (4) sampling and analysis plan and quality assurance project plan
	↓	
2.5	IDENTIFY NEEDED INSPECTION EQUIPMENT	• Identify necessary equipment for inspection
	↓	
2.6	DEVELOP AND COMPLETE PRE-INSPECTION WORKSHEET	• Develop worksheet • Complete worksheet

2.1 DEFINING THE SCOPE OF INSPECTION

The scope of the inspection will depend upon the corrective action activities underway at a facility.

The scope of the inspection will be determined in large part by whether the owner/operator is:

- Conducting stabilization activities
- Conducting investigations to characterize releases
- Conducting studies to evaluate corrective measure alternative(s) to address releases
- Implementing corrective measures

2.2 ASSEMBLING INSPECTION TEAM

Corrective action inspections can conducted by a single inspector; however, in many cases, it may be necessary for two or more inspectors to participate. The two major determinations to be made in assembling an inspection team are the number and types of inspectors needed.
The number of inspectors required depends upon several factors, including:

- Size of the facility (e.g., number of Soild Waste Management Units (SWMUs))
- Nature and complexity of corrective action activities at the facility (e.g., well installation at 10 SWMUs and excavation and extraction well installation at another)
- Scope of the inspection
- Multiple purposes for conducting inspection (some examples of multipurpose inspections include: cross-program compliance with regulatory or enforcement activities or another program office or agency is involved with the cleanup activities being conducted)

The types of personnel needed to conduct a corrective action inspection will vary according to the specific circumstances and the corrective action activities being conducted. The following factors should be considered when selecting personnel for the corrective action inspection team: (1) The technologies, or procedures, being used in the corrective action and; (2) The media affected by releases at the facility.

The technologies, or procedures, being used in corrective actions may dictate the types of personnel required because inspectors must understand the underlying engineering principles, or other specific processes, involved in certain activities. The use of relatively complex technologies, such as incineration, and certain other types of thermal treatment technologies, for example, may require that the inspection team include one of the designated EPA Regional hazardous waste combustion inspector/expert, or an experienced chemical or process engineer, or an individual in another discipline who is capable of evaluating the unit operations associated with such processes.

The media being investigated, or remediated, may also influence the selection of the inspection team. For example, if the facility has a complex subsurface environment and a remedy calls for remediation of groundwater, a hydrogeologist may be required on the inspection team to evaluate the efficiency of the remedy.

[*Note: There may be times when the inspector may need to consult with experts (e.g. hydrogeologist) before the inspection if the experts are not able to accompany the inspector on the inspection.*]

2.3 REVIEW BACKGROUND INFORMATION

Inspectors assigned to conduct corrective action inspections should review all documents relevant to the performance of corrective action at the facility. This may include background information developed under other federal, or State, environmental statutes, such as permits and reports prepared for EPA Regional and State agencies. The review will support development of the inspection plan for a facility.

Tables 2.1 and 2.2, below, identify the major sources of information pertinent to corrective action activities and also provide additional information that may be available from other EPA, or State program offices to assist inspectors in preparing for inspections.

TABLE 2-1

MAJOR SOURCES OF INFORMATION RELATED TO CORRECTIVE ACTION ACTIVITIES

Corrective Action Activity Information Sources
Corrective action orders, or hazardous waste permits
Current Conditions Report
Stabilization Evaluation Questionnaires
Approved Workplans for ISM, RFI, CMS, or CMI
ISM, RFI, CMS, and CMI Reports
Construction quality assurance plans
Remedy implementation and long-term maintenance plans
Sampling and analysis plans
Quality assurance project plans
RCRA Facility Assessment report
Progress reports
Aerial Photographs
RCRA Part A and Part B permit applications and closure plans
Compliance inspection reports, or information from enforcement orders that may contain information on waste generation and handling practices at the facility, perhaps including details on SWMUs, prior releases at the facility, migration pathways, and exposure points
National Corrective Action Prioritization System (NCAPS) ranking sheets and supporting documentation

TABLE 2-2

CONTINUATION OF INFORMATION SOURCES

Continuation of Information Sources
Permits and permit applications required under the National Pollutant Discharge Elimination System (NPDES) program, the Clean Air Act (CAA), and the state equivalents of these programs
CERCLA Preliminary Assessment (PA) and Site Inspection (SI) Reports
Installation Restoration Program (IRP) reports for Department of Defense facilities
CERCLA Hazard Ranking System (HRS) Documentation Record
CERCLA Remedial Investigation/Feasibility Studies (RI/FS)
CERCLA 103(c) notifications
Inspection reports prepared under the authority of CAA, the Toxic Substances Control Act (TSCA), and the Clean Water Act (CWA)
Emergency response community, such as the Fire Department, may have information on spills which have occurred at the Facility
Exposure information reports required under 40 CFR 270.10(j) that may be available from facilities seeking permits for landfills and surface impoundments, containing exposure information that includes potential exposure points, and possibly discussing the likelihood of human exposure to hazardous constituents
Solid waste permits and permit applications
Biennial reports (required under 40 CFR 265.75) that provide a description of hazardous waste shipments received during the previous year; the quantities of each shipment received; and the method of treatment, storage, and disposal of hazardous wastes
Notice to local authority (required under 40 CFR 265.14), a report that is submitted by the owner or operator within 90 days after closure of a disposal unit and includes descriptions of the types, locations, and quantities of wastes in units closed before promulgation of the 40 CFR Part 265 regulations
The RCRA administrative record provides background information used in the development of the order, or permit conditions for corrective action and information on public participation. It also provides insight into the problems in implementing corrective action at the facility.

2.4 DEVELOP A FACILITY-SPECIFIC INSPECTION PLAN AND CHECKLIST

Once the inspector has determined the scope of the inspection, discussed the inspection with appropriate team members (e.g., attorney assigned to the case, other offices, State personnel), and reviewed all background information relevant to the facility, he/she should prepare a brief plan outlining the step-by-step process for inspecting the facility. The inspection plan should provide a framework for inspection activities, identify the roles and responsibilities of each member of the inspection team, and provide a means for the inspector to double check that all relevant inspection activities at the facility have been conducted.

2.4.1 Inspection Plan

The primary purpose of the inspection plan is to lead the inspection team through the inspection. The plan should provide a clear list of inspection objectives, based on information obtained from the preinspection review of documents and any discussions with Regional or State staff. It should specify the roles and responsibilities of each member of the inspection team. The plan should be prepared in accordance with the preference of the individual inspector in a way that will make it most useful to him or her. In general, the plan should include the following components:

- Objectives of inspection
- Brief facility background
- Tasks to be performed
- Quality Assurance Project Plan (QAPP) and Sampling and Analysis Plan (SAP)
- Health and Safety Plan
- Resources
- Schedules

An inspection plan outline and an example of an inspection plan is provided on pages 2-7 and 2-8. The <u>RCRA Inspection Manual</u> is a further source of information inspectors may reference to aid them in the development of an inspection plan, or for information on facility notification, entry to the facility, conducting an opening meeting, staff interviews, and review of records.

FIGURE 2
EXAMPLE
INSPECTION PLAN OUTLINE

I. **Objectives** - The objectives should be discussed and agreed upon by all appropriate personnel (inspection team members, project manager, management, etc.). The objectives should define what the inspection is to accomplish (e.g., to assess compliance with approved ISM workplan).

II. **Background** - Discuss, in general, facility operations/processes and identify permits and orders applicable to the facility.

III. **Tasks** - Define tasks for accomplishing the objectives. Specify the procedures for obtaining the necessary information and evaluating facility compliance. The tasks may involve an evaluation of operation and maintenance practices, reporting practices, recordkeeping, sampling, etc.

IV. **Quality Assurance Project Plan (QAPP) and Sampling and Analysis Plan (SAP)** [1] - The plan should be attached to this inspection plan. If split samples are taken, the SAP should identify the type of samples to be collected, the sampling technique and sampling equipment to be used, and laboratories and analytical methods that will be used. The QAPP should specify quality assurance and quality control procedures to ensure the results obtained from the samples are valid.

V. **Health and Safety Plan** [2] - The plan should be attached to this inspection plan. The inspectors should review the facility's health and safety plan to identify equipment and procedures the investigation team should follow. In general, EPA and State inspectors should follow the Occuptional Safety and Health Administration (OSHA) guidelines set forth in 29 CFR 1910.120(e) and (f) for facilities involved in corrective action.

VI. **Resources** - Describe special personnel needs and equipment requirements. Experienced and knowledgeable personnel shall compose the inspection team. Table 2-3 lists equipment commonly used on inspections.

VII. **Schedules** - Provide general schedules for inspection activities. The dates for 1) starting and finishing inspection activities (e.g., observe excavation procedures, observe sampling techniques, inspect decontamination stations, etc.), 2) analytical work, and 3) draft and final reports (should be established and agreed upon by the inspection participates).

[1] Inspectors may refer to the following document for further assistance: **Preparation Aids for the Development of Category 1 Quality Assurance Project Plans (EPA/600/8-91/003).**

[2] Inspectors may refer to the following guidance documents for further assistance: 1)**Health and Safety Audit Guidelines (EPA/540/G-89/010) and 2)Standard Operating Safety Guides (OSWER Directive No. 9285.1-03, June 1992)**

Example

INSPECTION PLAN
INTERIM/STABILIZATION MEASURE INSPECTION
SOIL REMOVAL
ABC ELECTRIC COMPANY

Objectives

- Observe excavation procedures and determine compliance with approved interim/stabilization measure workplan
- Observe sampling techniques and collect split samples

Background

The ABC Electric Company site is an electromaterials facility located on approximately 100 acres in Topin, Ohio. In operation since 1946, the facility primarily manufactures plastic and copper clad fiberglass laminates. The facility is surrounded in the immediate area by residential, agricultural, manufacturing, and commerical properties.

In 1988, EPA issued an Administrative Consent Order which required ABC to submit an Interim/Stabilization Measure (ISM) workplan for removal of contaminated soils in Area of Concern (AOC) 1 and AOC 2 and to perform a RCRA Facility Investigation and a Corrective Measure Study.

Soil samples taken from AOCs 1 and 2 (from a previous investigation conducted by ABC) revealed elevated levels of contaminats such as cadium, lead, PAHs, and chromium. High levels of lead, cadium, and chromium have been detected in monitoring wells located in AOCs 1 and 2. Domestic wells are located 350 to 400 feet east of the site. The City of Topin operates a wellfield approximately 2 miles north, upgradient of the plant site.

According to the approved ISM workplan, ABC will excavate approximately 6,000 cubic yards of contaminated soil. The excavated soil will be disposed of within the closed landfill area (unit C). Landfill C has been designated as a Corrective Action Management Unite (CAMU). Remediation of unit C will be determined once the RFI has been completed.

Tasks

Inspection objectives will be addressed by:

- Compilation and review of EPA and/or State facility files

INSPECTION PLAN FOR INTERIM/STABILIZATION MEASURE INSPECTION CONTINUED

- Meetings with appropriate team members (inspection team members, project manager, ORC, managment)
- An on-site inspection

Meetings with inspection team and project manager took place on March 20 and 31, XXXX. The on-site inspection is scheduled to begin on April 15, XXXX).

The on-site inspection will include:

- Discussion of current corrective action activities being conducted with facility personnel
- Observing excavation procedures, sampling procedures, taking split samples
- Conducting closing meeting with facility

Health and Safety Procedures

Health and Safety procedures to be followed during the on-site inspection will comply with those described in the attached safety plan. In general, inspectors will follow the facility's approved health and safety plan and the Occupational Safety and Health Administration (OSHA) guidelines set forth in 29 CFR 1910.120(e) and (f).

Quality Assurance Project Plan (QAPP) and Sampling and Analysis Plan (SAP)

The SAP and QAPP procedures to be followed during the on-site inspection will comply with those described in the attached SAP and QAPP plan.

Resources

- EPA and/or State geologist
- EPA toxicologist
- Name of laboratory to be used
- Region Environmental Service Division support

Equipment needs include: Field notebook, camera and film, personnel identification, inspection checklist, steel toed boots, hard hat, ear plugs, safety glasses, gloves, and tyvek suit. Obtain same sampling equipment identified in ABC approved sampling analysis plan.

Schedules

March 1, XXXX	EPA Region X will notify facility of inspection (verbally and in writting)
April 15, XXXX	Initiate on-site inspection
April 20, XXXX	Draft report to project manager

Example

HEALTH AND SAFETY PLAN
FOR THE ISM INSPECTION OF THE ABC ELECTRIC COMPANY

The OSHA Hazardous Waste Site Worker Standards (29 CFR 1910.120) and EPA protocols require certain safety planning efforts prior to field activities. The following format is aligned with these requirements. Training and certifications are required in addition to this plan.

Inspection type:__________________

Inspection team members:______________________________

Project Manager:____________________________

DESCRIPTION OF ACTIVITY

If any of the following information is unavaiable, mark N/A; if covered in the inspection plan, mark "IP".

Facility Name:_______________________________

Location:___________________________________

Approximate size (# of acres):________
# of SWMUs:_______

Brief description of the inspection activity and job tasks to be performed:

Duration of the planned activity:__________________

Date of beginning the inspection:_______________

Site accessiblity by air or road:__________________

# of miles of nearest hospital:_____

Name, address, phone # of hospital:

HAZARDOUS SUBSTANCE AND HEALTH HAZARDS INVOLVED OR SUSPECTED AT THE FACILITY

Fill in the information that is known or suspected

Facility Name:_______________________________

Address:_________________________________

Type of facility:___ Large Quantity Generator ___ Small Quantity Gen
___ Interim Status TSDF ___ Permitted TSDF

List Waste Management Units:______________________________

____

Areas of Concern	Chemical and Physical Properties	Identity of Substance and Precautions
Explosivity:	______________	____________
Radioactivity:	______________	____________
Oxygen Deficiency:	______________	____________
Toxic Gases:	______________	____________
Skin/Eye Contact Hazard:	______________	____________
Heat Stress:	______________	____________

Personnel Protective Equipment

Head and Eye:	Clothing:	
__ Face Shield	__ Tyvek Coverall	__ Overboots
__ Goggles	__ Saranex Coverall	__ Rain Gear
__ Noise Protection	__ Cotton Coverall	__ Other
__ Gloves	__ Splash Suit	__________

Respiratory

____ Air Purifying Respirator (Type:___________________)
____ Air Purifying Respirator Cartridge(Type:_____________)
____ Escape Mask (Type:___________________)
Other ___________________________

Decontamination/Disposal Procedures for Sampling Equipment and Personnel Protective Equipment.

____
____
____
____

2.4.2 Inspection Checklist

While the inspection plan serves as the framework for an inspection, the inspection checklist serves as documentary evidence that the plan has been carried out. There is no generic checklist for all corrective action activities, because requirements for corrective action performance differ from facility to facility. Therefore, a checklist must be tailored specifically for each corrective action inspection. In developing a checklist, the inspector should rely heavily on the corrective action permit conditions or order, the corrective action workplan, and documents such as Sampling and Analysis Plans (SAPs) and Quality Assurance Project Plans (QAPPs). Examples of inspection checklists for ISM, RFI, CMS, and CMI inspections can be found in Appendix B.

Citation of permit conditions, enforcement order requirements, or workplan requirements should be included with each question or set of questions. Each question should be phrased so that they can be answered with a *yes* or *no*. Additional space should be left at the end of each section for noting observations and additional questions that may arise during the inspection.

In general, inspectors should use **checklists** in conjunction with **field logbooks** to record inspection observations. Inspectors are encouraged to use the procedures detailed above, however, inspectors should follow Regional and State protocols when preparing inspection checklists.

2.5 IDENTIFY EQUIPMENT NECESSARY FOR THE INSPECTION

In planning a CA inspection, it is important to know what equipment will be needed to properly perform inspection activities. Equipment that may be required for a CA inspection includes general equipment (for example, a camera), safety equipment, and if necessary, sampling equipment.

Table 2-3 below is a list of equipment that is commonly used in performing inspections. The list is divided into three categories: general equipment, safety equipment, and sampling equipment.

TABLE 2-3

EQUIPMENT COMMONLY USED IN INSPECTIONS

General Equipment	
• Field notebook	• Camera and film
• Clipboard	• Video camcorder
• Waterproof pen or marker	• Facility documents
• Inspection checklist	• Personal identification
• Lap top computer (optional)	• Tape recorder
Safety Equipment	
• Steel-toed boots	• Air purifying respirator (with appropriate cartridges)
• Hard hat	• Tyvek (barricade) suit
• Ear plugs	• Impervious boots
• Safety glasses	• Gloves (chemical resistant)
• Air monitoring equipment	
Sampling Equipment	
• Stainless-steel shovels or trowels	• Coolers
• pH meter or indicator strips	• Stainless-steel or Teflon bailers
• Stainless-steel mixing bowls	• Air pumps and Tenax tubes
• Chain-of-custody forms	• Sampling thief
• Sampling bottles, labels, and perservatives	• Decontamination equipment
Inspectors should never proceed with inspections involving site conditions for which they are not prepared and do not have the proper safety equipment.	

2.6 PREINSPECTION WORKSHEET

The purpose of a pre-inspection worksheet is to serve as:

- An internal check on performance of all necessary preinspection activities
- A planning tool to enable the inspector to perform preinspection activities more effectively

The sample pre-inspection worksheet shown in Figure 3 is designed to assist inspectors in identifing, assembling, and reviewing all relevant materials prior to departure for an inspection. Completion of this worksheet helps to ensure that the inspection will be performed efficiently and will meet the objectives of the inspection. ***This sample worksheet is intended <u>only as a guide</u> and should be modified to reflect and incorporate the specific needs of each inspector.***

FIGURE 3

PREINSPECTION WORKSHEET

Task Completed			Description of Activity
Y	N	N/A	Contact Project Office/Project Manager
Y	N	N/A	Contact/coordinate with other offices
			Identify and obtain all relevant information (See tables 2-1 and 2-2)
Y	N	N/A	Approved Workplans
Y	N	N/A	- Previous corrective action inspection reports
Y	N	N/A	- Health and safety plan
Y	N	N/A	- Permit or order
Y	N	N/A	- Progress reports
Y	N	N/A	- Administrative record
Y	N	N/A	- RFA report
Y	N	N/A	- Other reports (e.g., ISM report)
			Prepare inspection plan
Y	N	N/A	- Develop SAP
Y	N	N/A	- Develop QAPP
Y	N	N/A	- Notify the facility
Y	N	N/A	- Entry strategy
Y	N	N/A	- Opening meeting
Y	N	N/A	- Records review/staff interviews
Y	N	N/A	- On-site inspection procedures
Y	N	N/A	- Split sampling
Y	N	N/A	- Closing meeting
Y	N	N/A	Prepare inspection checklist
Y	N	N/A	Identify and procure equipment

2.7 SUMMARY

Inspectors have been presented with information and approaches that should assist them in preparing for corrective action inspections. ***Although these approaches are only suggestions, inspectors are encouraged to consider the material presented and adopt relevant portions for their own use.***

Key Steps in Preparing for a Corrective Action Inspection

- Define the purpose and objective of the inspection
- Assemble an inspection team
- Review background information
- Develop and complete preinspection checklist
- Identify needed inspection equipment
- Develop facility specific inspection plan and checklist

3.0 CONDUCTING CORRECTIVE ACTION INSPECTIONS

This chapter presents guidance on when to inspect corrective action site activities and how to identify common problems associated with these activities. The chapter contains five sections, beginning with a general discussion of on-site inspections and split sampling activities, which may apply to any phase of a corrective action. The remaining four sections are each specific to one phase of the corrective action process: interim/stabilization measures, RCRA facility investigations, corrective measure studies, and corrective measures implementations. Each of these sections include a table describing key activities to inspect and common problems found during each respective phase of a corrective action.

The information in this chapter is most effective when inspectors use it in preparing their facility-specific inspection plan and inspection checklists (which were described in the previous chapter, and in Appendix B). This information may also be useful to an inspector during a facility inspection when he/she encounters unanticipated corrective action activities and/or equipment needs.

3.1 ON-SITE INSPECTION

The on-site inspection of a facility should proceed in accordance with the facility-specific inspection plan developed by the inspector during pre-inspection planning. This plan should outline the corrective action activities to be inspected and the tentative order in which they will be inspected. To accommodate conditions they may encounter at a facility, inspectors should change their planned approach as needed.

3.1.1. Critical Events to Consider for Inspection

The activities and technologies associated with corrective actions vary considerably between different facilities. In general, there are a number of activities and technologies that are common to numerous facilities and potentially critical for inspection during specific stages of a corrective action.

Table 3-1 summarizes those common activities and technologies that represent critical events to be considered for corrective action inspections. The activities range from sampling of soil and other media, removal activities, and the implementation of remedial technologies.

TABLE 3-1

OVERVIEW OF CRITICAL ACTIVITIES TO CONSIDER FOR INSPECTION

Activities	Interim/Stabilization Measure(s)	RCRA Facility Investigation	Corrective Measure Study	Corrective Measure Implementation
Sampling of soil, subsoil, sludge, groundwater, and other media	✓	✓	✓	✓
Excavation of soil, sludge, or subsoil	✓	✓		✓
Installation of groundwater monitoring and extraction systems	✓	✓		✓
Installation of air strippers, carbon filtration units, thermal desorption units, soil vapor extraction units, and other equipment	✓	✓		✓
Geophysical surveys, such as electromagnetic (EM) for locating buried SWMUs or old spill areas	✓	✓		
Investigative tests, such as tracer tests and tests to determine groundwater pathways	✓	✓		

Activities	Interim/Stabilization Measure(s)	RCRA Facility Investigation	Corrective Measure Study	Corrective Measure Implementation
Development of stabilization treatment techniques, such as sludge and soil stabilization	✓			
Installation of air surveillance monitoring systems	✓	✓		✓
Bench-scale or pilot-scale studies to determine the applicability of a corrective measure technology or technologies			✓	
Installation of covers or caps	✓			✓
Install groundwater barrier systems	✓	✓		✓
Abandonment of groundwater monitoring and extraction wells				✓

3.1.2 Split Sampling

This section provides inspectors guidance for conducting split sampling activities during a corrective action inspection. Collection of media samples may not be required during a corrective action inspection; however, if sampling activities were identified as necessary during the pre-inspection preparation process, then an inspector should be aware of the key concepts concerning sampling and analysis.

This guidance manual is not intended to be a complete guidance manual on sampling and analysis, or a substitution to previous guidance manuals regarding sampling and analysis procedures. This manual is designed only to provide some guidance on the types of sampling that may be required during a corrective action inspection and to provide some guidance on the concepts of split sampling. The following is a list of guidance documents providing specific information on the collection of media samples:

- U.S. Environmental Protection Agency. 1980. *Samplers and Sampling Procedures for Hazardous Waste Streams*. EPA/600/2-80-018.
- U.S. Environmental Protection Agency. 1992. *RCRA Ground-Water Monitoring: Draft Technical Guidance*. PB 93-139350.
- U.S. Environmental Protection Agency. 1986. *User's Guide to the Contract Laboratory Program*. EPA/540/P-91/002.
- U.S. Environmental Protection Agency. 1987. *A Compendium of Superfund Field Operation Methods*. EPA/540/P-87/001. OSWER Directive No. 9355.0-1.
- U.S. Environmental Protection Agency. 1987. *Draft Site Sampling and Field Measurements for Underground Storage Tank Releases*.
- U.S. Environmental Protection Agency. 1991. *Soil Sampling and Analysis for Volatile Organic Compounds*.
- U.S. Environmental Protection Agency. 1992. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Second Edition*. EPA/SW-846.3-1.
- U.S. Environmental Protection Agency. 1988. *Technical Case Development Guidance*. OSWER Directive No. 9938.3.

3.1.2.1 Purpose of Split Sampling

Sampling of environmental media (soil, surface water, sediment, groundwater, air, and subsurface gas), including the collection of split samples during a corrective action inspection, may be required for several reasons. These reasons may include: verifying compliance with a corrective action order or corrective action permit conditions, to confirm cleanup after a corrective measure, to act as a statistical check of sample analysis collected by the owner/operator, to measure the effectiveness of a corrective action technology, or to determine the extent of contamination requiring a corrective action.

3.1.2.2 Split Sampling Tools and Equipment

The tools needed to ensure an effective inspection should include the equipment necessary to collect inspection samples, relevant health and safety equipment, and necessary equipment for documenting sampling techniques. As stated earlier, all equipment that an inspector should need will be spelled out in the Sampling and Analysis Plan (SAP). An inspector should be familiar with the use, application, and limitations of equipment specified for sample collection. Each media and each type of sample may require special sample collection techniques, or specific equipment to assure a representative sample. The incorrect use of sampling equipment, the use of the wrong equipment, or poor sampling techniques can lead to the collection of unrepresentative samples. If an inspector is unfamiliar with the use or application of a particular piece of sampling equipment, he/she should seek out the advice of others who have had experience with the equipment. An example of application of specific equipment is the use of a peristaltic pump to sample surface water, or groundwater, for metals and other nonvolatile parameters. The use of the same peristaltic pump for sampling volatile organics or oil and grease is not recommended because the potential for volatile stripping to occur is very high and the oil and grease can adhere to the tubing of the pump. Examples of sampling equipment commonly used are found in Table 3-2.

TABLE 3-2
EXAMPLES OF COMMONLY USED SAMPLING EQUIPMENT

Media to be Sampled	Equipment	
Surface Water	Kemmerer sampler Van Dorn sampler Weighted-bottle catcher Peristaltic pump	
Sediment	Dredge Corer Scoop	
Groundwater	Bailers: - Top-filling - Bottom-filling - Thief	Pumps: - Air-lift pump - Suction-lift - Submersible bladder - Gas-driven piston
Soil Water (unsaturated zone)	Lysimeter	
Soil	Grain sampler or sampling trier (disturbed samples) Split spoon (undisturbed sampler), trowel, scoop, or corer	
Soil Gas	Vapor extraction equipment/passive vapor sampler	
Sludge or Slurry	Glass tube samplers Bacon tube samplers Pumps Weighted-bottle samplers Kemmerer or Van Dorn sampler	

Media to be Sampled	Equipment
Air (Sampling and Monitoring)	Colormetric tubes Pumps Air detection meters (organic vapor analyzer, photo-ionization detector, explosive meters, and others) Radiation meters

3.1.2.3 Split Sampling Procedures

Generally, when an inspection team conducts split sampling activities, the inspection team should use the following general procedures:

- The inspection team will provide all necessary sampling containers, labels, perservatives, paperwork, and shipping containers.
- The team will ask the owner/operator to collect split samples using the same equipment and procedures that the owner/operator uses to collect his or her own samples. This is recommended to help assure reproducability of sampling data by using the same equipment and sampling from the same batch or location that the owner/operator is sampling from.
- The inspection team should document the sampling protocol used, persons collecting the samples, and equipment used to collect the samples using written notes and photographs.
- An inspection team must be aware of the disposition of the samples once they have been collected
- An inspector should know how to preserve the samples, and correctly fill out the sample chain-of-custody, sample tracking forms, and labels
- An inspection team member must be experienced in proper sample handling and current shipping requirements, and should coordinate sample arrival time frames with the selected analytical laboratory.
- If the EPA Contract Laboratory Program is to be used, familiarity with the protocols of the program is necessary. Inspectors may refer to the *Users Guide to the Contract Laboratory Program* for more information on the specifics of this program.
- The inspector should make sure the samples are analyzed by the same analytical technique as the facility's samples in order to be comparable.

- The inspector is required, under Section 3007(a), to give the owner, operator, or agent in charge a receipt describing the samples obtained prior to leaving the premises. If any analysis is made of such samples, the inspector is required to provide a copy of the results of such analysis to the owner, operator, or agent in charge.

3.2 INTERIM/STABILIZATION MEASURES INSPECTIONS

Interim/stabilization measures (ISMs) are normally initiated when EPA or an authorized State determines that it is necessary to control, or abate, threats to human health and/or the environment from releases and/or to prevent, or minimize, the further spread of contamination while long-term remedies are pursued. Examples of ISMs include providing bottled water, erecting a fence around contaminated soils, excavating and removing contaminated soils, etc. ISMs are actions used to achieve the goal of stabilization.

Implementation of ISMs is similar to a corrective measure implementation, that is, once a measure has been selected, an owner/operator prepares documents that specify how the measure will be designed, constructed, implemented, and maintained, and submits those documents to EPA, or an authorized State representative, for approval. Once the documents have been approved, the owner/operator is responsible for implementing the selected ISM in accordance with those plans. Inspectors should refer to Section 3.5 of this chapter for more information concerning the implementation of corrective measures.

ISMs will generally be required of a facility owner/operator through either a corrective action order or through a permit modification. The order, or permit modification, should detail specific activities to be performed by the owner/operator, including preparation of a workplan, a sampling and analysis plan, a construction quality assurance plan, and an implementation and long-term maintenance plan. Where rapid action is required to minimize threats to human health and the environment, EPA or an authorized State may require that ISM activities be initiated immediately under an order or permit. If a facility does not have a permit or order, a statement should be made regarding how and under what authority a facility is required to implement ISMs. Also, if a facility voluntarily agrees to conduct ISMs, the inspector should record any resulting environmental/monetary benefits of such an action for both EPA/State and the facility.

Table 3-3 lists some common problems associated with ISMs that inspectors should look for during inspections. Some of these problems may require immediate resolution due to safety considerations. Inspectors should ensure such problems are immediately brought to the attention of the facility project manager. Since the complexity and scope of ISMs vary greatly, an inspector may be required to rapidly develop familiarity with several types of technologies and methods, or enlist the assistance of persons who are already familiar with them.

TABLE 3-3

COMMON PROBLEMS ASSOCIATED WITH SELECTED INTERIM MEASURES/STABILIZATION ACTIVITIES

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Overpacking and Redrumming	Activity to prevent leakage from corroded, damaged, uncovered, and/or bulging drums or containers. Consists of transferring material into a new or otherwise acceptable container (redrumming) or placing the damaged container into an overpack container (overpacking).	Drums, bulldozers, drum crushers, front-end loaders, backhoes, forklifts, cranes, drum grapplers, drum punches, drum pumps, barrel carts, nonsparking tools, grounding equipment	• Void spaces are not completely filled with inert materials • Noncompliance with RCRA requirements for liquids and lab packs • Improper testing and labelling techniques • Incompatible waste materials are placed into the same overpack drum (the CMI workplan or the health and safety plan should address incompatible materials on a site-specific basis) • Overpacked drums are not properly staged before they are sent off-site • Handling, storage, and disposal of residue generated (rinsate, containers) are not in accordance with applicable regulations

TABLE 3-3

COMMON PROBLEMS ASSOCIATED WITH INTERIM MEASURES/STABILIZATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Segregation	During segregation, incompatible, or potentially incompatible, materials are separated or moved to avoid potential hazards during handling or storage. Segregation generally includes measures identified elsewhere in these tables such as waste removal, removal of free liquids, temporary cap/cover, interceptor trenches, etc.	Bulldozers, front-end loaders, backhoes, forklifts, cranes, drum grapplers, drum pumps, barrel carts, nonsparking tools, grounding equipment	• Use of safety measures that are not consistent with materials being handled. For example, sparking hand tools are used around drum handling areas. • Handling, storage, and disposal of residues generated (rinsate, containers) is not in accordance with applicable regulations
Removal and/or On-Site Immobilization of Free Liquids and Highly Mobile Wastes	Source control measure to remove liquids, sludges, or other mobile wastes. Generally, liquids are pumped, or otherwise diverted, and collected and placed in containers or bulk tanks for transport to a treatment or disposal area. Alternatively, these mobile wastes may be immobilized on site by mixing them with suitable solidification/stabilization agents. Removal of free liquid may include interceptor trench/drain measures discussed elsewhere in this table.	Drums, bulldozers, front-end loaders, backhoes, forklifts, cranes, bulk tanker trucks, drum grapplers, drum pumps, barrel carts, nonsparking tools, pumps (centrifugal, positive displacement), solidification/stabilization agents, mixing tanks and equipment	• Improper pump selection and operation. Pump selection and operating parameters depend on properties of the liquid to be handled (pH, viscosity, temperature, vapor pressure), required flow rates, intake and discharge pressures, metering, and solids content. • Improper selection of solidifation/stabilization agents may increase the volume of mobile wastes • Handling, storage, and disposal of residues generated (rinsate, containers) are not in accordance with applicable regulations

TABLE 3-3

COMMON PROBLEMS ASSOCIATED WITH INTERIM MEASURES/STABILIZATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Temporary Cap/Cover	Measure to isolate material from surface runoff and infiltration, prevent transport of contaminated sediment and debris, and prevent the formation and transport of leachate. Involves the placement of a synthetic and/or natural cover on the contaminated media.	Cover materials such as membrane liners, cap materials, bulldozers, front-end loaders, backhoes, forklifts, cranes, nonsparking tools	• Cap/cover materials are not of appropriate thickness and permeability • Cap/cover materials are not constructed of material compatible with the physical and chemical characteristics of the waste being covered • Cap/cover materials may be damaged or fail to operate as designed if incorrectly installed • Areas of stressed vegetation indicating a breakthrough in the cap • Presence of depression areas or low zones that pool, or collect, rainwater resulting in seepage into the area and subsequent leachate problems • Improper positioning of runon/runoff controls

TABLE 3-3

COMMON PROBLEMS ASSOCIATED WITH INTERIM MEASURES/STABILIZATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Waste Excavation and/or Removal	Consists of a variety of methods to excavate or otherwise collect wastes for placement in containers for transport to a treatment or disposal area. Waste removal may include demolition, excavation, or other measures discussed elsewhere in this table such as removal of free liquids.	Drums, bulldozers, front-end loaders, backhoes, forklifts, cranes, bulk tanker trucks, drum grapplers, drum pumps, barrel carts, nonsparking tools	• Improper equipment selection and operation. Equipment selection and operation depend on physical and chemical properties of the waste to be handled (percent solids, quantity, toxicity, density), bearing capacity of the site, and packaging of the waste (drums, rolloff bins) • Incompatible wastes are stored in the same area • Improper area for excavation, or demolition identified • Sampling and field analysis is not conducted according to the approved sampling and analysis plan • Use of safety measures is not consistent with materials being handled. For example, sparking hand tools are used. • Handling, storage, and disposal of residues generated (rinsate, soils, containers) are not in accordance with applicable requirements

TABLE 3-3

COMMON PROBLEMS ASSOCIATED WITH INTERIM MEASURES/STABILIZATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Interceptor Trench/Sump Subsurface Drain	Measure to collect/channel/divert contaminated material/ground water. Method used to control migration of contaminated material and transport it to a treatment or removal system.	Bulldozers, front-end loaders, backhoes, forklifts, cranes, non-sparking tools, grout material, drainage components	• Ability to function restricted by geotechnical considerations (depth to bedrock),hydrogeological considerations (groundwater flow, depth), size of site, and soil characteristics (permeability) • Improper installation of drainage components affecting the ability of the measure to function properly • Handling, storage, and disposal of residues generated (soil) are not in accordance with applicable regulations. For example, the measure may result in water discharges subject to regulation under the Clean Water Act.
Runon/Runoff Control (diversion or collection device)	Measure to control ground water/surface water contamination by intercepting and diverting runoff from an area or preventing runoff from leaving the area. Collected contaminated water may be transported to a treatment system. Uncontaminated runoff may be redirected or collected through the use of above-ground structures such as berms and dikes.	Bulldozers, front-end loaders, backhoes, forklifts, cranes, nonsparking tools, dike/berm/drainage materials (membrane liners, soil, clay, rocks, concrete)	• Ability to function restricted by site conditions such as topography, drainage pattern, precipitation characteristics, vegetation, size of site, and soil characteristics (permeability) • Improper design and construction of drainage affect the ability of the measure to function properly • Handling, storage, and disposal of residues generated (soil) are not in accordance with applicable regulations. For example, the measure may result in water discharges subject to regulation under the Clean Water Act.

TABLE 3-3

COMMON PROBLEMS ASSOCIATED WITH INTERIM MEASURES/STABILIZATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Application of Dust Suppressant (water or chemical)	Measure to control fugitive dust generated by soil movement, wind erosion, or vehicle travel.	Water wagons, bulk tanker trucks, spray equipment, water, chemical suppressants (salts, surfactants, adhesives, bitumens), water/chemical suppressant storage tank	• Types of chemical suppressants, dilution factors, and application methods and rates must be monitored closely • Application of suppressants results in runoff from site • Placement of chemicals on land not in accordance with applicable regulations
Physical Containment (Groundwater Barrier Systems)	Includes numerous methods that involve the placement of physical barriers such as dikes, walls, or other structures to prevent the escape of contaminants from a defined area. Groundwater barrier systems, a type of physical containment, refers to the placement of a vertical, low-permeability, material (natural or synthetic) beneath the water table to divert groundwater away from a source of contamination.	For Groundwater barrier systems: Bulldozers, front-end loaders, backhoes, non-sparking tools, low-permeability material (such as synthetic membranes, clay, or asphalt), pumps	For Groundwater barrier systems: • Proper installation and functioning may be restricted by hydrogeological considerations (groundw ater flow, depth), size of site,and position of wastes in relation to the water table • Improper installation of barrier materials may affect the ability of the measure to function properly

TABLE 3-3

COMMON PROBLEMS ASSOCIATED WITH INTERIM MEASURES/STABILIZATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Hydraulic Containment (Groundwater Pumping and Treatment Systems)	Includes a number of methods that use pumping to prevent the escape of contaminants from a defined area. Groundwater pumping and treatment systems, an example of hydraulic containment combined with treatment, involves the placement of wells downgradient of a source of contamination and pumping contaminated water to a treatment system prior to reinjection or surface discharge of the treated water.	For Groundwater pumping and treatment systems: Drilling rigs, well construction materials (such as casings, grouting materials, screens, and pumps), flow rate monitors, water treatment systems (such as carbon adsorption units, filters, piping, surge tanks, and flocculation chemicals)	For Groundwater pumping and treatment systems: • Proper installation and functioning may be restricted by hydrogeological considerations (groundwater flow, depth), size of site, and position of wastes in relation to the water table • Improper number and/or placement of wellsand/or complex hydrogeologic settings may affect the ability to capture all of the contaminated groundwater downgradient from the source ofcontamination • Improper construction of wells may cause poor yields and/or cross contamination betweenaquifers • Improper selection of treatment methods may eliminate expected benefits from the system • Handling, storage, and disposal of contaminated groundwater may result in water discharges in violation of regulations under the Clean Water Act

TABLE 3-3

COMMON PROBLEMS ASSOCIATED WITH INTERIM MEASURES/STABILIZATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Soil Vapor Extraction	Involves the placement of vertical or horizontal extraction vents in an unsaturated soil zone, which has been contaminated with volatile organic constituents (VOCs). Such vents are connected to a vacuum manifold to extract VOCs from the soil and direct them to a treatment system, such as a carbon adsorption unit. Soil vapor extraction systems may be associated with air sparging systems in the groundwater or air injection systems in the unsaturated zone.	Drilling rigs, well construction materials (such as casings, grouting materials, and screens), vacuum gauges, air treatment systems (such as carbon adsorption units, filters, piping, and air strippers)	• Proper installation and functioning may be restricted by soil characteristics, such as moisture content and air permeability, size of site, and position of wastes in relation to the water table • Improper numbers and/or placement of vents and/or complex geologic settings may affect the ability to capture VOCs • Improper construction of vents may cause poor yields of VOCs • Improper selection of air treatment methods may eliminate expected benefits from the system • Soils that have high organic contents or are extremely dry may result in reduced removal rates • Residual liquids and spent carbon from off-gas treatment may require treatment and/or disposal
Fencing	Consists of installing security fencing to control access to an area. Measure may include posting of warning signs.	Fencing (posts, screen, signs), post hole digger, nonsparking tools	• Fencing may not be appropriately sized and installed to prevent unauthorized access • Significant portion of the population may not speak English, therefore, cannot read the signs • Handling, storage, and disposal of residues generated (soil) may not be in accordance with applicable regulations • Cutting of fences by dirt bikers, etc

TABLE 3-3

COMMON PROBLEMS ASSOCIATED WITH INTERIM MEASURES/STABILIZATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Active Stabilization Remediation	Consists of any or all of the above-mentioned interim measures/stabilization activities that are conducted to prevent the imminent release of contaminants into the environment. Such actions may form part or all of the final remedy for a site.	Any or all of the above-mentioned equipment, as appropriate	Any or all of the above-mentioned problems may arise, depending on which activities and/or technologies are selected for active stabilization remediation

3.3 RCRA FACILITY INVESTIGATION INSPECTIONS

The RCRA Facility Investigation (RFI) is the first phase in the corrective action program. The RFI is to determine the nature and extent of hazardous waste or constituents from regulated units, solid waste management units, and other source areas at a facility and to gather all necessary data to support a Corrective Measure Study (CMS) and/or ISMs.

Activities conducted under the RFI can range from sampling various media (e.g. soil, groundwater, sludge, subsoil, etc.) to installing groundwater monitoring/extraction systems. The scope of the RFI may vary depending on whether the owner/operator performed investigation activities prior to issuance of a corrective action order, or a permit or permit modification. An order or permit modification will identify specific activities to be performed by the owner/operator, including preparation of a workplan, a sampling and analysis plan, a quality assurance plan, and a health and safety plan. Table 3-4 presents common problems that inspectors should look for during RFI activities. Some of these problems may require immediate resolution due to safety considerations. Inspectors should ensure such problems are immediately brought to the attention of the facility project manager.

TABLE 3-4

COMMON PROBLEMS ASSOCIATED WITH RCRA FACILITY INVESTIGATION ACTIVITIES

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
General Sampling	Collection of small quantities of wastes or naturally occurring materials from a site to conduct field or laboratory analyses.	Hand trowels, hand augers, push probes, scoops	• Samples not taken in the manner specified in the approved sampling and analysis plan • Sampling equipment that comes in contact with the waste is not decontaminated properly between sampling stations • Sample containers are not cleaned properly • Samples are not preserved properly • Blank and duplicate samples are not taken • Samples are not collected and transported in accordance with proper chain-of-custody procedures • Field sampling and analytical equipment is not calibrated according to the manufacturer's specifications
Sampling of Surficial Soil	Sampling techniques and equipment used at depths of from zero to three feet below ground surface to determine the nature and extent of any surficial release that may have occurred from a SWMU or AOC.	Hand trowels, hand augers, Shelby Tube, push probes	• Surficial soil samples and the locations from which they were taken are not consistent with those designated in the sampling and analysis plan • Deviations are not recorded in the field logbook • Alternative sample locations selected due to conditions at the site such as the locations of buildings or paved areas, are not noted and/or do not achieve the objectives of surficial soil sampling.

TABLE 3-4

COMMON PROBLEMS ASSOCIATED WITH RCRA FACILITY INVESTIGATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Sampling of Subsurface Soil	Sampling techniques and equipment used to collect soil or waste from depths of three feet or more to determine the nature and extent of any release that may have occurred from a SWMU or AOC.	Machine-driven augers, split-spoon samplers	• The depth of each sample is not recorded • Borings are not properly filled and abandoned or properly cased after sampling • Borings are not grouted at the annulus • Borings are not fitted with a locking cap (Also see above)
Soil Gas Sampling	Sampling techniques and equipment used to determine the presence or absence of volatile organic constituents. The sources of such gas may include contaminated groundwater, buried waste containing volatile constituents, or buried waste undergoing biological degradation.	Hand or machine-driven augers; gas collection wells; temporary gas collection borings; vacuum pumps; glass, teflon, or stainless steel gas collection lines and containers	• Not recording the condition of the surface and subsurface soils at each soil gas sampling point (e.g., noting the soil moisture, particle size, color, soil type) • Not recording the location of where the sample was taken • Not recording the depth of each sample

TABLE 3-4

COMMON PROBLEMS ASSOCIATED WITH RCRA FACILITY INVESTIGATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Groundwater Sampling/ Installation of Groundwater Monitoring Wells	Sampling techniques and equipment used to determine the presence or absence of waste constituents in groundwater beneath a facility.	Groundwater monitoring wells, bailers, pumps (submersible, gas-driven piston, suction lift, and other types)	• Groundwater monitoring wells are not drilled with the equipment and/or at the locations and depths specified in the RFI workplan • Samples are not properly filtered and perserved • The wells are not constructed with the materials and according to the procedures specified in the RFI workplan. Most wells must be cased to prevent cross-communication of water among multiple aquifers or to maintain the integrity of the borehole in unconsolidated sediments. The anular space (between the casing and well) usually must be grouted with bentonite or other suitable material (<u>not drill cuttings</u>) to prevent potentially contaminated surface water from entering directly to the groundwater. • Wells are not fitted with a locking cap to prevent tampering by unauthorized personnel • Well casings are glued rather than joined mechanically • Bailers or portable pumps are not decontaminated thoroughly and rinsed between drillings and between different screening depths in the same well • Insufficient purging of groundwater from monitoring wells (should obtain three successive readings of specific conductance within 10%, temperature with 5°C, and pH 0.1 unit) • Surface seals are not intact, which can allow infiltration of surface water • Improper sampling, storage, and disposal of purged

TABLE 3-4

COMMON PROBLEMS ASSOCIATED WITH RCRA FACILITY INVESTIGATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Air Sampling/ Monitoring	Sampling techniques and equipment used to determine the presence or absence of airborne hazardous constituents.	High-volume air samplers; small vacuum pumps; glass, teflon, or stainless steel gas collection lines and containers; and organic vapor analyzers	• The number and location of air sampling stations is not consistent with the RFI workplan • Adjustments are not made to account for current wind directions and velocities, as required • Calibrations not done
Surface-Water and Benthic Sediment Sampling	Sampling techniques and equipment used to determine the presence or absence of waterborne hazardous constituents.	Kemmerer samplers, peristaltic pumps, scoops, triars, and dredge samplers (such as Peterson or Ponar)	• The flow rate of any flowing water body is not recorded, as well as the depth at which each sample was taken • Field measurements for each sample was not taken or recorded (such as pH, temperature, conductivity, and dissolved oxygen)

3.4 CORRECTIVE MEASURES STUDIES INSPECTIONS

A corrective measures study (CMS) is a study that is designed to identify and evaluate potential alternatives for the remediation of releases of hazardous constituents that have been identified at the facility. The evaluation of various corrective action technologies, for the most part, is a paper exercise. As part of this exercise, however, EPA often will require owners or operators to conduct treatability studies to determine the effectiveness of remedies under consideration. Inspectors may consider conducting inspections at facilities performing treatability studies as part of the CMS.

Two types of treatability studies may be performed as part of a CMS: bench-scale and pilot-scale. Bench-scale treatability studies usually involve small-scale applications of a technology and usually are conducted in a laboratory. Pilot-scale treatability studies usually involve applications of a potential remedy on a larger scale than bench-scale treatability studies. Pilot-scale treatability studies usually are conducted at the owner's or operator's facility and generally involve more extensive sampling of the waste streams entering and exiting the unit. Table 3-5 presents common problems associated with CMS activities that inspectors should look for during their inspection. Some of these problems may require immediate resolution due to safety considerations. Inspectors should ensure such problems are immediately brought to the attention of the facility project manager.

TABLE 3-5

COMMON PROBLEMS ASSOCIATED WITH CORRECTIVE MEASURES STUDY ACTIVITIES

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Bench-Scale Treatability Studies	Laboratory study in which small volumes of media are tested for the individual parameters of a treatment technology. Used to define process kinetics, compatibility of materials, effects of environmental factors, types of doses of chemicals, active mechanisms, and other parameters.	Laboratory equipment such as flasks, tubing, and pumps that have been designed and built to simulate actual or design-stage; full-scale equipment	• Selection and documentation of testing conditions does not focus on how each test condition represents actual field conditions, full-scale equipment limitations and capabilities, and waste characteristics • Shipment and handling of waste materials off-site are not in compliance with specific guidelines
Pilot-Scale Treatability Studies	On-site simulation of physical and chemical parameters of a full-scale treatment process. Used to define design and operation criteria, materials of construction, ease of handling and construction of material, and other parameters.	Field equipment that was designed and constructed to achieve treatment results obtained during bench-scale studies. Such equipment is more similar to the full-scale equipment in terms of size, capacity, throughput, and materials of construction.	• Sample wastes and media are not representative. For example, adequate mixing of treatment reagents and heat with wastes is generally more difficult at the full-scale stage; thus pilot-scale equipment capabilities should not exceed achievable full-scale equipment capabilities. • Handling, storage, and disposal of residues are not in accordance with applicable requirements

3.5 CORRECTIVE MEASURES IMPLEMENTATION INSPECTIONS

Before conducting a CMI inspection, an inspector should become familiar with the technology being designed, constructed, or implemented as part of the remedy. The inspector should review the approved CMI workplan and associated documents (for example, implementation and long-term maintenance plan and design drawings and specifications) to determine whether the workplan requires the use of a specific technology. Once the inspector has determined what technologies are required, the inspector should become familiar with those technologies, if necessary. The inspector should also become familiar with the inspection activities for each technology that are contained in the facility's inspection plan for the CMI. Tables 3-6 lists several types of corrective measures used to remediate contaminated media, and identifies likely problems inspectors need to look for or may encounter while conducting the inspection. Some of these problems may require immediate resolution due to safety considerations. Inspectors should ensure such problems are immediately brought to the attention of the facility project manager. Inspectors can find information on several treatment technologies in the following documents:

- U.S. Environmental Protection Agency. 1989. *Guide to Treatment Technologies for Hazardous Waste at Superfund Sites*. EPA/540/2-89/052.
- U.S. Environmental Protection Agency and U.S. Air Force. 1993. *Remediation Technologies Screening Matrix Reference Guide*. EPA/540/B-93/005.
- U.S. Environmental Protection Agency. 1988. *Technology Screening Guide for Treatment of CERCLA Soils and Sludges*. EPA/540/2-88/004.
- U.S. Environmental Protection Agency. 1985. *Handbook: Remedial Action at Waste Disposal Sites (Revised)*. EPA/625/6-85/006.
- U.S. Environmental Protection Agency. 1991. *Innovative Treatment Technologies: Overview and Guide to Information Sources*. EPA/540/9-91/002.

TABLE 3-6

COMMON PROBLEMS ASSOCIATED WITH CORRECTIVE MEASURES IMPLEMENTATION ACTIVITIES

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Contaminated Soil/Debris Excavation	Contaminated soil or debris is removed from an area for treatment or transport.	Shovels, backhoes, bulldozers, scrapers, draglines	• Improper decontamination of equipment before leaving the contaminated zone (as designated in the site health and safety plan) • Dump trucks used to haul waste (especially on public roads) are not lined or covered • Monitoring for hazardous levels of volatile organics (as required in the site health and safety plan) is not conducted • Sampling of excavated material and underlying substrate designed to ensure that all target materials have been removed and to confirm the types and concentrations of contaminants is not representative • Improper staging of any contaminated material results in contaminant migration to air or water before transport or on-site treatment • Handling, storage, and disposal of excavated soil/debris and/or residues are not in accordance with applicable requirements
Soil Vapor Extraction	Vacuum-assisted removal of volatile organic constituents from soil and conveyance to a carbon filter or other treatment system.	Vacuum pumps connected to header pipes, gas extraction wells, gas treatment system	• Inappropriate number and depth of extraction wells • Vacuum pressure readings are not at design levels • Gas filters are not working properly • Volatile constituents concentrations (before and after treatment) are not being monitored as planned and/or are not at expected levels

TABLE 3-6

COMMON PROBLEMS ASSOCIATED WITH CORRECTIVE MEASURES IMPLEMENTATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Bioremediation (in situ and ex situ)	Microbial action is employed to breakdown or detoxify organic constituents. Physical mixing process in which wastes, biotic materials, nutrients, and an oxygen source (for aerobic processes) are combined in prescribed proportions. After mixing, the materials are allowed to react until there is a need to add more nutrients, biotic materials, oxygen, or for ex-situ processes, waste.	Biotic materials (such as plants, microorganisms, or bacteria), nutrient mixtures, oxygen sources, systems to deliver and monitor the degradation process	• Nutrient, oxygen, and biotic delivery systems are not working properly • Methods to measure degradation rates and products are not working properly • Imbalances in the mixing processes

TABLE 3-6

COMMON PROBLEMS ASSOCIATED WITH CORRECTIVE MEASURES IMPLEMENTATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Capping	The placement of a synthetic or natural cover to prevent the migration of waste constituents. Caps may be single- or multilayer, and temporary or permanent.	Materials include flexible membrane liners, clay, geomembrane filters, sand, pea-gravel, and topsoil. Equipment may include backhoes, bulldozers, scrapers, liner seamers, and compactors.	• Underlying waste is not properly compacted prior to placement of the cover to prevent settlement damage • Thicknesses and sequencing of the cap layers are not consistent with the design specifications • Results of permeability, compaction, and moisture content testing of compacted clay are not in accordance with design specifications • Placement of geofabrics and/or geomembranes is not conducted according to manufacturers specifications • Seams of geofabrics and geomembranes are not tested according to plans • Proper precautions are not taken by heavy-equipment operators to prevent accidental puncturing of the flexible membrane liner during placement • Drainage layer is not continuous and properly sloped • Runoff controls are not in proper position • Stressed vegetation (in natural caps) indicating a breakthrough in cap • Presence of depression areas or low zones that pool or collect rainwater resulting in seepage into the area and subsequent leachate problems

TABLE 3-6

COMMON PROBLEMS ASSOCIATED WITH CORRECTIVE MEASURES IMPLEMENTATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Air Stripping	The use of mechanical action to effect the mass transfer of volatile constituents from a solid or liquid medium to a gas medium. It usually is associated with carbon absorption or some other form of gas treatment technology.	Air stripper designs include packed column, diffused basin, cross-flow tower, and coal tray aerator. Most are designed to strip aqueous waste. All designs include a waste inlet and outlet and an air (or gas) inlet and outlet.	• Influent and effluent gas and waste flow rates and pressures to and from the air stripper are not within the design range specified in the CMI workplan • Air monitoring equipment is not working properly. Air monitoring equipment may be operating improperly if it indicates unusually low or high concentrations of contaminants or provides erratic readings. • Gas treatment equipment situated downstream of the air stripper is not working properly • pH variations cause scale or corrosion problems • Iron bacteria
Carbon Filtration (of liquids and gases)	Liquids or gases are passed through an activated carbon filter that removes specific types of organic constituents.	Gas or liquid pumps, activated carbon, carbon absorption tanks or other reaction chamber containing carbon	• Flow rate to and retention time of the carbon absorption unit do not meet the design specifications in the CMI workplan • There are no methods in place for immediately detecting when the carbon is "spent" (this is called contaminant breakthrough) and when it needs to be replaced • Contingencies are not in place to interrupt or divert the flow of waste when carbon is being replaced or when the carbon unit becomes clogged • There are no holding vessels downstream of the carbon absorber unit to allow testing of treated waste before it is discharged • Spent carbon is improperly disposed of

TABLE 3-6

COMMON PROBLEMS ASSOCIATED WITH CORRECTIVE MEASURES IMPLEMENTATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Solidification and Stabilization (in situ and ex situ)	Mixing of contaminated waste solids or semisolids with various binding agents to reduce the mobility, or in some cases the toxicity, of hazardous constituents.	Various solidification reagents including silicate-based products, cement-based products, and various sorbents. Also various mixing equipment for combining wastes with reagents.	• Mixture ratios of additives are not consistent with the specifications in the CMI workplan (there usually are metering devices that measure the amount of each ingredient before it is placed in a mixing chamber or injected into an in situ mixing device) • Appropriate curing time is not allowed before stabilized materials are moved or capped (curing temperatures are also important for some types of processes) • Quality testing procedures are not performed in accordance with the CMI workplan. Raw wastes are often monitored for total concentrations of constituents that have the potential to affect the mixing ratios of wastes to additives. Treated wastes often are tested by a leaching procedure to monitor effectiveness of treatment. • Inadequate mixing to allow full contact with reagents

TABLE 3-6

COMMON PROBLEMS ASSOCIATED WITH CORRECTIVE MEASURES IMPLEMENTATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Drum Over-Packing	Activity to prevent leakage from corroded, damaged, uncovered, and/or bulging drums or containers. Consists of transferring material into a new or otherwise acceptable container (redrumming) or placing the damaged container into an overpack container (overpacking).	Overpacking drums (usually 55 or 80 gallons in capacity), forklifts, bulldozers, drum crushers, drum grabbers, remote drum openers, grounding equipment	• Void spaces are not completely filled with inert materials • Noncompliance with RCRA requirements for liquids and lab packs • Improper testing and labelling techniques • Incompatible waste materials are placed into the same overpack drum (the CMI workplan or the health and safety plan should address incompatible materials on a site-specific basis) • Appropriate safety measures are not applied for each type of material being overpacked • Overpacked drums are not properly staged before they are sent off-site • Handling, storage, and disposal of residue generated (rinsate, containers) are not in accordance with applicable regulations

TABLE 3-6

COMMON PROBLEMS ASSOCIATED WITH CORRECTIVE MEASURES IMPLEMENTATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Thermal Desorption	Waste solids are heated to temperatures that are high enough to cause the solids to volatilize, but not high enough to cause chemical changes, such as oxidation.	There are a number of designs and operating temperatures, depending on the constituents being desorbed. Usually associated with a downstream system for capture of off-gases.	• Temperature controls are not consistent with those in the CMI workplan • Temperatures, retention times, and readings of gas flow rate are not within the operating ranges presented in the CMI workplan • Downstream gas treatment systems (such as a condenser or carbon adsorber) are not operating properly • Equipment used to test effluent gases and residual solids is not operating properly • Oversized particles are entering the system

TABLE 3-6

COMMON PROBLEMS ASSOCIATED WITH CORRECTIVE MEASURES IMPLEMENTATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Metal Precipitation from Liquids	Mixing of liquid wastes in a tank with various binding agents that cause metals and particulate matter to settle out in a downstream holding tank(s).	Binding agents (such as alum or synthetic flocculation aides), mixing tank, settling tank (or clarifier), sludge pump, filter press or vacuum filter	• Flow rates for waste liquids and binding agents are not within design specifications in the CMI workplan • Sizes and retention times of the mixing and settling tanks do not follow design specifications • Binding agents are not those specified in the CMI workplan • The effluent is not being tested for and/or meeting the quality criteria for metals and suspended solids, or other parameters that are specified in the CMI workplan • Sludge in the settling tank is not being removed, dewatered (by drying, filter pressing, vacuum filtration, or other technologies), and treated in accordance with the CMI workplan • When a filter press is used to dewater solids, pressure is not applied until filtrate flow ceases

TABLE 3-6

COMMON PROBLEMS ASSOCIATED WITH CORRECTIVE MEASURES IMPLEMENTATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Slurry Walls	Subsurface walls used to divert the flow of groundwater away from buried and capped waste materials. The walls are made of bentonite clay mixed with soil or cement.	Backhoes, bulldozers, bentonite pellets, water, cement mix	• Testing methods are not conducted (as prescribed in the CMI workplan) to confirm that the slurry trench is being excavated to the appropriate depth to ensure that the slurry wall will be keyed into a previously targeted, low permeability substrate beneath the saturated zone (such testing involves the comparison of properties of the excavated materials with the known properties of the confining layer that was chosen for keying in of the slurry wall) • Bentonite pellets or other prescribed additives are not mixed into the slurry trench according to the approved design • Trench is not placed at the correct coordinates • Dimensions of the trench are not at appropriate width and/or length

TABLE 3-6

COMMON PROBLEMS ASSOCIATED WITH CORRECTIVE MEASURES IMPLEMENTATION ACTIVITIES (continued)

ACTIVITY/ TECHNOLOGY	DESCRIPTION	TYPICAL EQUIPMENT AND SUPPLIES	COMMON PROBLEMS
Runon and Runoff Controls	Above ground structures, such as berms and flow channels, that are used to contain rain water that has mixed with waste and to divert uncontaminated rain water away from waste materials. They typically are made of soil, clay, concrete, rocks, and other materials.	Backhoes, bulldozers, cement mixers, flexible membrane liners, geofabrics, compaction equipment, graders	• Berms, channels, and other structures are not sized, sloped, and placed according to design drawings in the approved CMI workplan • Possible areas of high and turbulent flow are not protected from erosion • Testing is not performed on clay materials, as specified in the CMI workplan (such testing may include moisture content and compaction density)

4.0 PREPARING THE CORRECTIVE ACTION INSPECTION REPORT

4.1 REPORT PREPARATION

The report that inspectors prepare greatly impacts on the adequacy of followup to correct problems or deficiencies noted during the CA inspection. Reports should be organized in a way that allows the enforcement officer (EPA Regional or State project manager) and their supervisors to make maximum use of information obtained.

Objective:
An inspection report should organize and coordinate all relevant information and evidence gathered during inspection in a comprehensive and usable manner. To meet this objective, the information presented in an inspection report should be:

- Accurate - all information must be factual and based on sound inspection practices.
- Relevant - information in the report should be pertinent to the subject of the report.
- Comprehensive - the subject of the report should be substantiated through the inclusion of all available relevant factual information.

There are four basic steps to effective report preparation. These are:

- Review information collected during the inspection and determining what is needed in the report
- Organize information in a logical manner (e.g., field notes, photos, checklists, data, maps, etc.)
- Reference accompanying materials (such as, the corrective action order, permit condition(s), or approved RFI workplan) to properly support the report and so the reader can easily locate that information
- Write the narrative report in an effective manner.

4.1.1 Review Information Collected During the Inspection

A summary of information reviewed (e.g., corrective action order or relevant permit conditions, approved workplans, reports, etc.) should be incorporated into the report to describe the inspection purpose and scope, provide background information, and to give a framework to the findings contained in the report. For example, the corrective action order, or permit conditions, will provide the basis for identifying violations. Text contained in the RFI workplan or RFA can provide factual background information on the facility setting, manufacturing and waste management activities, and SWMUs.

4.1.2 Organize Materials

Information collected during the inspection must be organized in order for it to support the report's findings. The inspector should date all photographs, identify the photographs' orientation and provide captions. The inspector should make copies of the field notes, checklist(s), and laboratory analyses to be included as appendices in the report. Maps and other diagrams should be separated and properly labeled for inclusion in the report. Events and correspondence should be ordered chronologically to give better historical perspective (if needed) in the report.

4.1.3 Reference Accompanying Material

The inspector should generate a reference list that includes documents, or other information, that the inspector actually uses in preparing the report. For example, if the inspector uses sections of the corrective action, order or RFA, as part of the report text, then the report should reference these documents. Each item that is referenced in the corrective action report, should be given a formal reference (such as, XYZ Inc., 1986, RCRA Facility Assessment of ABC Company). Important elements to include in any reference are the author(s), date, and title. The final reference list should be included as part of the report. A benefit of referencing documents in the report is that it reduces the length of the report, and directs the reader to other documents for information.

4.1.4 Writing the Narrative Report

The report narrative should focus on facts obtained from the inspection. To accomplish this, the narrative portion of the report should be written using plain and simple language and avoid conjecture. When writing the narrative the inspector should be concise, but should not omit any facts, details, or necessary explanation. Finally, the inspector should proof read and spell check the report for completeness and errors.

Figure 4 depicts an example narrative outline for a corrective action report.

FIGURE 4

EXAMPLE OUTLINE FOR CORRECTIVE ACTION INSPECTION REPORT

I. GENERAL INFORMATION

A. Purpose and scope of inspection

B. Facility Information (Name, Address, Telephone Number)

C. Facility Representation (Names, Titles, Telephone Numbers)

D. Inspection Participants (Names, Agency or Company, Title, Phone Numbers)

E. Date of Inspection

F. State Coordination (Assisted by..; Copy of report to..)

G. Facility Description (brief summary of the facility's operations, waste management practices or SWMUs relevant to the scope of the inspection)

II. NARRATIVE - SUMMARY OF CORRECTIVE ACTION INSPECTION

A. Description of corrective action activities being performed at the site during the inspection

B. Activities performed by the inspector

C. Data interpretation, if applicable

III. POTENTIAL PROBLEMS AND DEVIATIONS FROM REQUIRED PRACTICES

APPENDICES

A. PHOTOGRAPHS

4.1.4.1 General Information

This section of the report should include a brief description of the purpose and scope of the inspection, the date of the inspection, the names and affiliations of the inspection participants, names of facility representatives, and a brief facility description. The majority of this information can be summarized from the inspection plan.

4.1.4.2 Summary of Corrective Action Inspection

This section of the report should answer the following questions: what was inspected; how it was examined; and when it was inspected. Much of this information will be derived from the inspector's field notes, checklists (if used), and photographs. The inspector should also include references to appropriate photographs when writing this section.

4.1.4.3 Apparent Violations or Deviations From Stated Practices

This section of the report details any deviations by the facility from the approved procedures discovered during the inspection. Any deviation should be discussed and referenced to the applicable section of the corrective action order or permit condition. The inspector should also note, for example, any deviations from the owner/operator's workplan, sampling and analysis procedures, or other technical procedures (stated in the owner/operator's construction plans, health and safety plan, reports, or otherwise agreed upon with or required by the Agency). If many violations or deviations are discovered, then the inspector may wish to use a table to summarize the findings. For example, the inspector should note when the owner/operator has sampled at a different location than specified in the sampling plan. The inspector should also note why the sample location was altered.

4.2 SUPPORTING DOCUMENTATION

Documentary support provides evidence of the inspector's procedures, findings, and bolsters the report's recommendations. A report is not complete unless it contains the appropriate documentary support.

Documentary support includes:

- Photographs
- Field notes
- Sampling and analysis data
- Maps
- Correspondence
- Checklists
- Video documentation

4.2.1 Photographs and Field Notes

Photographs and field notes are the inspector's primary evidence collected during most field inspections. The quality and the content of these items is crucial to supporting any noted violations or deviations. All photographs should be numbered and captioned with the time, date, orientation, and a brief description. All photographs should be referenced with the narrative description in the report. Field notes should be legible and should be specific enough to allow reconstruction of the activities that occurred during the inspection.

4.2.2 Sampling and Analysis Data

If split samples were taken during the inspection, then the inspector should include the analytical data obtained from the laboratory report as documentary support. The inspector should include relevant sampling information, such as the location, sample type (media), and analytes. In addition, a sample location map should be included in the report.

4.2.3 Maps

Maps are especially helpful in describing activities that occurred during the inspection. Most maps may be obtained from existing documents, such as SWMU maps in the RFA or RFI workplan, and modified to fill specific needs. All maps should include orientation, scales, and a key or legend of symbols used.

4.2.4 Correspondence

Copies of any correspondence (e.g., notes written from telephone conversations or interviews, facsimiles, or letters) obtained as part of an inspection and referenced in the report should be included in the supporting documentation. It is important that the inspector assign all comments to specific individuals during the inspection and note this in the field notes. The inspector should avoid conjecture in documenting such statements, and avoid imparting the inspector's opinion, or conclusions in the statements.

4.2.5 Checklists

Checklists are generally set up in a tabular format with a column containing the item of interest (such as a decontamination procedure) and other columns identifying whether the item is provided, adhered to, or not applicable. Checklists used during the inspection are evidence that the inspector should include as an attachment, or appendix, in the report.

4.3 FOLLOW-UP ACTIVITIES TO THE PREPARATION OF A CORRECTIVE ACTION INSPECTION REPORT

Once a corrective action inspection report has been completed, inspectors likely will have to initiate a number of follow-up activities. These may include:

- Submission of the report to enforcement officials (EPA Regional or State project coordinator) possibly including followup dicussions concerning potential enforcement actions
- Distribution of the report to the owner/operator and other interested parties (e.g., State agencies program offices)
- Placement of the report in the files for the EPA Region or State

The procedures for the use of a corrective action report will vary within each EPA Region, or State, environmental agency. Inspectors should refer to Regional, or State, protocol to determine if any further technical or enforcement actions may be required.

4.4 CORRECTIVE ACTION ENFORCMENT ACTIONS

When preparing for and conducting corrective action inspections, inspectors always should keep in mind that the results of the corrective action inspection eventually may be used to support an enforcement action. For that reason, inspectors should carefully document all findings made during the on-site inspection and when preparing the corrective action report. Any data obtained or measurements made during the inspection should be technically correct and accurate.

Actions That May Be Taken as a Result of an Inspection
• Issuance of a warning letter
• Modification of a permit
• Issuance of a civil administrative action
• Initiation of a judicial civil referral
• Initiation of a criminal investigation

Although the type and relevance of evidence necessary to complete the actions listed above will vary, an inspector should always conduct a corrective action inspection as if its results will be used to support any of the actions listed above.

4.5 SUMMARY

Inspectors should focus on all of the necessary follow-up work which includes the following:

Follow-up Activities To A Correction Action Inspection

- Reviewing and organizing information and materials collected during pre-inspection report
- Writing a corrective action inspection report
- Compiling documentary support for a corrective action inspection report
- Followup activities such as distribution of corrective action report and discussions with appropriate personnel

APPEDIX A

SECLECTED CORRECTIVE ACTION DOCUMENTS

SELECTED CORRECTIVE ACTION DOCUMENTS

PROGRAM GUIDANCE

U.S. Environmental Protection Agency. May 1984, *OWRS Guidance for Preparation of QA Project Plans* (OWRS QA-1, May, 1984).

U.S. Environmental Protection Agency. July 15, 1985, *Federal Register* (50 *FR* 28702). Final Codification Rule; Final Rule. OSW-FR-85-079.

U.S. Environmental Protection Agency. July 1986, *Construction Quality Assurance for Hazardous Waste Land Disposal Facilities* (EPA 530/SW-85-031, July 1986).

U.S. Environmental Protection Agency. 1986. *National RCRA Corrective Action Strategy*. EPA/530/SW-86/045.

U.S. Environmental Protection Agency. 1986. *RCRA Facility Assessment (RFA) Guidance*. EPA/530/SW-86/053, PB87-107769.

U.S. Environmental Protection Agency. December 1, 1987, *Federal Register* (52 *FR* 45788). *Codification Rule for 1984 RCRA Amendments; Final Rule*. OSW-FR-88-002.

U.S. Environmental Protection Agency. 1988. *RCRA Corrective Action Interim Measures*. OSWER Directive No. 9902.4, PB91-139881.

U.S. Environmental Protection Agency. May 31, 1994. *RCRA Corrective Action Plan*. OSWER Directive No. 9902.3-2A.

U.S. Environmental Protection Agency. 1989. *RCRA Corrective Action Outyear Strategy*.

U.S. Environmental Protection Agency. 1989. *RCRA Facility Investigation (RFI) Guidance*. EPA/530/SW-89/031, PB89-200299.

U.S. Environmental Protection Agency. July 27, 1990, *Federal Register* (55 *FR* 30798). *Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities; Proposed Rule*. OSW-FR-90-012.

U.S. Environmental Protection Agency. 1991. *Guidance on RCRA Corrective Action Decision Documents*. EPA/540/G-91/011, PB91-201256.

U.S. Environmental Protection Agency. October 25, 1991. Memorandum (Lowrance to Waste Management Division Directors). *Managing the Corrective Action Program for Environmental Results: The RCRA Facility Stabilization Effort.*

U.S. Environmental Protection Agency. 1992. *Compendium of ORD and OSWER Documents Relevant to RCRA Corrective Action.* EPA/530/B-92/003.

U.S. Environmental Protection Agency. 1992. *Corrective Action Glossary.* OSWER Directive No. 9902.3-1a, PB92-963614.

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APPEDIX B

EXAMPLE INSPECTION CHECKLISTS FOR ISM, RFI, CMS, AND CMI

EXAMPLE ISM INSPECTION CHECKLIST

This example interim/stabilization measures inspection checklist is developed for an interim measure consisting of: collection of soils for analytical testing to determine the extent of contamination; excavation of contaminated soils; loading of the soils onto trucks for off-site disposal; completion of confirmatory sampling; and backfilling the removal area with clean soils. All work is to be completed in accordance with a health and safety plan prepared by the facility, which requires continuous air monitoring, level "C" personal protective equipment, and the use of dust control measures.

	Yes	No	Comments
1. Site Preparation Activities: Has the facility implemented the following procedures, in accordance with the approved workplan?			
a. Are support facilities provided, as set forth in the approved workplan?	❑	❑	________
b. Has the vertical and horizontal extent of the area(s) subject to removal or excavation been identified and delineated, as required?	❑	❑	________
c. Is access to the excavation or removal area(s) restricted, as required?	❑	❑	________
d. Has the site been cleared of debris, as required to facilitate excavation and backfill operations?	❑	❑	________
e. Has the exclusion zone (EZ) been identified?	❑	❑	________
f. Has the contamination reduction zone (CRZ) been identified?	❑	❑	________
g. Has the support zone (SZ) been identified?	❑	❑	________
h. Are required surface-water drainage controls in place?	❑	❑	________
i. Are specified soil erosion and dust prevention controls in place?	❑	❑	________
j. Are equipment and personnel decontamination areas established, as required?	❑	❑	________
k. Has the facility identified a treatment, storage, or disposal facility for waste liquids and other residues of decontamination?	❑	❑	________
l. Have local utilities been notified of the removal or excavation, as required?	❑	❑	________

EXAMPLE ISM INSPECTION CHECKLIST
(continued)

	Yes	No	Comments
2. Excavation and Removal: Are the following procedures being conducted in accordance with the approved workplan?			
a. Are the equipment and crew specified in the workplan being used?	❑	❑	________
b. Has the area been excavated to the required horizontal extent?	❑	❑	________
c. Is the area being excavated to the required depth?	❑	❑	________
d. Is air monitoring being conducted continuously during excavation?	❑	❑	________
e. Is equipment being decontaminated before transfer from removal and excavation area to another?	❑	❑	________
f. Are soil staging areas being used as required?	❑	❑	________
i. Are containment measures taken to prevent contamination of clean areas?	❑	❑	________
ii. Are runon and runoff control measures in place?	❑	❑	________
g. Are the areas of excavation and removal covered when removal operations are not underway?	❑	❑	________
h. Is the excavation or removal area fenced?	❑	❑	________
3. Transportation of Hazardous Waste Off Site: Are the following procedures used by the facility in accordance with the approved workplan?			
a. Are the trucks used to transport waste licensed to do so in the appropriate states?	❑	❑	________
b. Is waste being properly manifested as required by 40 CFR 262.20?	❑	❑	________
c. Is waste lined and covered as required before it is removed from the site?	❑	❑	________
d. Are waste removal trucks placarded as required before they leave the site?	❑	❑	________
e. Have the appropriate environmental agencies in the state receiving waste been notified, as required?	❑	❑	________
f. Has the transportation route for the waste been identified?	❑	❑	________

EXAMPLE ISM INSPECTION CHECKLIST
(continued)

	Yes	No	Comments
g. Have the waste removal trucks been weighed (on site or off site)?	☐	☐	____
h. Are the vehicles transporting the waste being decontaminated, as required, after the hazardous waste has been loaded into the vehicles?	☐	☐	____
4. Recordkeeping and Data Management: Is the facility performing the following tasks, in accordance with the approved workplan?			
a. Are daily field logs of the ISM action being kept?	☐	☐	____
b. Are the weight tickets for the vehicles transporting the waste being kept?	☐	☐	____
c. Is the disposal facility that receives the waste provided correctly completed manifests?	☐	☐	____
d. Is the facility receiving the appropriate copies of the waste manifest?	☐	☐	____
e. Are daily waste removal and excavation inventories being kept?	☐	☐	____
f. Is the regulatory agency receiving the documentation required by the corrective action plan?	☐	☐	____
5. Health and Safety: Is the facility implementing the following procedures, in accordance with the approved workplan?			
a. Are workers at the site conforming to the health and safety requirements?	☐	☐	____
i. Is the appropriate personal protective equipment being used?	☐	☐	____
ii. Is all required air monitoring being completed?	☐	☐	____
iii. Are the required personnel decontamination procedures being used?	☐	☐	____
iv. Are excavation areas cleared of live utility lines and similar hazards (for example, gas and electric lines and propane tanks)?	☐	☐	____

EXAMPLE ISM INSPECTION CHECKLIST
(continued)

	Yes	No	Comments
6. Sample Acquisition and Laboratory Testing: Is the facility performing the following activities, in accordance with the approved workplan?			
a. Are confirmatory samples being collected with the required frequency?	☐	☐	
b. Are approved methods being used in collecting samples?			
i. Soil	☐	☐	
ii. Air	☐	☐	
iii. Water	☐	☐	
c. Are samples being handled and preserved as required?			
i. Soil	☐	☐	
ii. Air	☐	☐	
iii. Water	☐	☐	
d. Is all required documentation of sampling being completed?			
i. Soil	☐	☐	
ii. Air	☐	☐	
iii. Water	☐	☐	
e. Are required chain-of-custody procedures being followed, including analysis for required parameters?	☐	☐	
f. Is sampling equipment being decontaminated properly before transfer from one sampling location to the next?	☐	☐	
g. Are samples being packaged and shipped in accordance with procedures specified in the approved workplan?	☐	☐	
h. Are sufficient and appropriate quality control samples being taken?	☐	☐	

EXAMPLE ISM INSPECTION CHECKLIST
(continued)

	Yes	No	Comments
7. Spill Control: Is the facility implementing the following procedures, in accordance with the approved workplan?			
a. Are spill control equipment and supplies in place?	☐	☐	______________
b. Do personnel at the site have documentation of training in the implementation of spill control procedures?	☐	☐	______________

EXAMPLE RFI INSPECTION CHECKLIST

The example RFI inspection checklist has been developed for an inspection of a chemical manufacturing facility that has been required to characterize the nature and extent of contamination resulting from releases of various organic and inorganic constituents from its several waste management units. The RFI workplan specifies that the facility conduct groundwater and soil sampling. The facility also prepared a health and safety plan for these sampling activities.

	Yes	No	Comments
1. Well Drilling Procedures: Is the facility implementing the following procedures, as specified in the approved workplan?			
a. Has the facility installed wells at the locations specified?	☐	☐	________
b. Has the facility drilled all boreholes to the required depth?	☐	☐	________
c. Have the casings been installed to the required depth?	☐	☐	________
d. Has the facility used the required drilling procedures?	☐	☐	________
e. Did the facility keep borehole logs, as required, during drilling operations?	☐	☐	________
2. Well Construction Procedures: Is the facility implementing the following procedures, in accordance with the approved workplan?			
a. Is each newly installed well equipped with screen and casing strings?	☐	☐	________
b. Did the facility use well screens of the correct length and diameter?	☐	☐	________
c. Did the facility use the correct screen slot size?	☐	☐	________
d. Did the facility use the specified filter pack material?	☐	☐	________
e. Did the facility use the specified well screen and riser material?	☐	☐	________
f. Has the facility installed filter pack material to the proper depth?	☐	☐	________
g. Has the facility placed bentonite pellets at the proper depth?	☐	☐	________

EXAMPLE RFI INSPECTION CHECKLIST
(continued)

	Yes	No	Comments
h. Has the facility used the specified type of sealant at the proper depth?	☐	☐	
i. Has the facility installed a lockable cover and a sloping concrete pad at each well?	☐	☐	
3. Well Development Procedures: Is the facility implementing the following procedures, in accordance with the approved workplan?			
a. Has the facility developed the well according to specified methods?	☐	☐	
b. Did the facility monitor specific conductance, pH, and temperature during development?	☐	☐	
c. Did the facility purge the required amount of water at each well?	☐	☐	
d. Did the facility manage well development water in accordance with specified procedures?	☐	☐	
4. Aquifer Testing: Is the facility implementing the following procedures, in accordance with the approved workplan?			
a. Did the facility perform hydraulic testing according to the specified pumping procedures?	☐	☐	
b. Did the facility use the required pumps and pumping rates?	☐	☐	
c. Did the facility monitor water-level measurements in the pumping well, using required procedures?	☐	☐	
5. Ground-Water Sampling: Is the facility implementing the following procedures, in accordance with the sampling and analysis plan (SAP) and quality assurance project plant (QAPP) included in the approved workplan?			
a. Was the correct volume of water purged from each well before the wells were sampled?	☐	☐	
b. Did the facility monitor pH, temperature, and specific conductance during well purging?	☐	☐	
c. Did the facility sample all groundwater wells according to specified procedures?	☐	☐	

EXAMPLE RFI INSPECTION CHECKLIST
(continued)

	Yes	No	Comments
d. Did the facility analyze the samples for the required volatile organic and inorganic parameters?	☐	☐	________
e. Were the specified method used in performing analysis?	☐	☐	________
f. Was all sampling equipment decontaminated according to specified procedures?	☐	☐	________
g. Were samples properly stored and packaged for shipment according to specified procedures?	☐	☐	________
6. Soil Drilling and Sampling: Is the facility implementing the following procedures, in accordance with the approved workplan?			
a. Did the facility use the specified procedures in drilling boreholes?	☐	☐	________
b. Were boreholes drilled to the specified diameters?	☐	☐	________
c. Were samples collected at required depths?	☐	☐	________
d. Were samples collected with the required sampling equipment?	☐	☐	________
e. Has the facility kept a drilling log, as required?	☐	☐	________
f. Was all sampling equipment decontaminated according to specified procedures?	☐	☐	________
g. Were samples packaged and shipped according to specified procedures?	☐	☐	________
h. Were boreholes abandoned according to specified procedures?	☐	☐	________
7. Data Management: Did the facility maintain all project files, as required under the approved workplan?	☐	☐	________
8. Health and Safety: Is the facility implementing the following procedures, as specified in the approved health and safety plan?			
a. Are safety zones around drill rigs established at the specified distances?	☐	☐	________
b. Are the boundaries of the safety zones flagged, as required?	☐	☐	

EXAMPLE RFI INSPECTION CHECKLIST
(continued)

	Yes	No	Comments
c. Are workers using air monitoring equipment wearing respiratory protection, as required?	❑	❑	______
d. Are records documenting health and safety training maintained, as required?	❑	❑	______
9. Emergency Procedures: Does the facility have an emergency procedure plan in place, as specified by the approved workplan?	❑	❑	______

EXAMPLE CMS INSPECTION CHECKLIST

This example CMS checklist has been designed to (1) ensure that all elements of a CMS inspection required of a facility have been completed and (2) serve as documentation of the results of an inspection. A corrective action order stating specific requirements and a workplan prepared by the facility -- with its associated sampling and analysis plan (SAP) and quality assurance project plan (QAPP) -- were used in compiling the checklist. Activities currently underway at the site include a pilot-scale study of an in-situ vapor extraction system. The facility uses carbon adsorption to treat contaminated groundwater. Treated groundwater is discharged to a local publicly owned treatment works (POTW).

	Yes	No	Comments
1. Groundwater Sampling: Are the following requirements being met, in accordance with the approved workplan, SAP, and QAPP?			
a. Sampling locations	☐	☐	______
b. Sampling depths	☐	☐	______
c. Frequency of sampling	☐	☐	______
d. Decontamination procedures	☐	☐	______
e. Parameters for analysis	☐	☐	______
g. Techniques for preparation of samples	☐	☐	______
h. Sample containers	☐	☐	______
i. Procedures for calibration of sampling equipment	☐	☐	______
j. Chain-of-custody procedures	☐	☐	______
k. Documentation of sampling	☐	☐	______
2. Sampling of Treated Effluent: Are the following requirements being met, in accordance with the approved workplan, SAP, and QAPP?			
a. Sampling locations	☐	☐	______
b. Frequency of sampling	☐	☐	______
c. Parameters for analysis	☐	☐	______
d. Methods of analysis	☐	☐	______
e. Techniques for preparation of samples	☐	☐	______
f. Sampling containers	☐	☐	______
g. Procedures for calibration of sampling equipment	☐	☐	______

EXAMPLE CMS INSPECTION CHECKLIST
(continued)

	Yes	No	Comments
h. Chain-of-custody procedures	❑	❑	________
i. Documentation of sampling	❑	❑	________
3. Operation of In-Situ Vapor Extraction System: Are the following operating parameters being recorded as described in the approved workplan?			
a. Air flow	❑	❑	________
b. Total amount of trichloroethylene removed	❑	❑	________
4. Operation of the Carbon Adsorption Unit: Is the facility operating the unit according to the schedule established in the approved workplan for the following procedures?			
a. Maintenance for removal of carbon	❑	❑	________
b. Disposal of spent carbon	❑	❑	________
5. Health and Safety: Is the facility using personal protective equipment, as specified in the approved health and safety plan?	❑	❑	________

EXAMPLE CMI INSPECTION CHECKLIST

This example CMI inspection checklist is based on the requirements that must be met by a facility required to install a cap on an abandoned landfill. Specifically, the elements of the checklist were drawn from the requirements set forth in the approved workplan, the design drawings and specifications, and the construction quality assurance plan (CQAP). The workplan specifically called for the installation of a layer of compacted soil, a flexible membrane liner, a synthetic drainage and filter layer, and a layer of topsoil and vegetation.

	Yes	No	Comments
1. Installation of a Layer of Compacted Soil: Is the facility constructing the soil layer in accordance with the requirements specified in the approved workplan, design drawings and specifications, and CQAP?			
a. Requirements for maximum clod size	☐	☐	________
b. Slope specifications	☐	☐	________
c. Thickness of soil	☐	☐	________
d. Field permeability and field density specifications	☐	☐	________
e. Moisture content	☐	☐	________
f. Procedures for placement, including restrictions on the placement of lifts and required coverage	☐	☐	________
g. Types of soil			
i. Atterburg limits	☐	☐	________
ii. Soil classifications	☐	☐	________
iii. Particle size	☐	☐	________
h. Compaction requirements	☐	☐	________
2. Installation of Flexible Membrane Liner (FML): Is the facility meeting the requirements specified in the approved workplan, design plans and specifications, and CQAP?			
a. Thickness of FML	☐	☐	________
b. Use of required material	☐	☐	________
c. Procedures for seaming	☐	☐	________
d. Procedures for sealing of holes	☐	☐	________
e. Procedures for anchoring	☐	☐	________

	Yes	No	Comments
f. Use of required procedures for placement of FML, including required coverage	❑	❑	________
3. Installation of Synthetic Drainage and Filter Layer: Is the facility meeting the requirements specified in the approved workplan, design plans and specifications, and CQAP?			
a. Thickness of material	❑	❑	________
b. Type of material	❑	❑	________
c. Procedures for placement, including required coverage	❑	❑	________
d. Procedures for anchoring	❑	❑	________
e. Permeability requirements for synthetic drainage layer	❑	❑	________
4. Installation of Layer of Topsoil and Vegetation: Is the facility meeting the following requirements specified in approved workplan, design plans and specifications, and CQAP?			
a. Thickness of layer	❑	❑	________
b. Type of soil	❑	❑	________
c. Procedures for placement, including required coverage	❑	❑	________
d. Slope	❑	❑	________
e. Type of vegetation	❑	❑	________
f. Soil pH	❑	❑	________
g. Fertilizers required	❑	❑	________
h. Seeding material required	❑	❑	________

APPENDIX C

CASE STUDY OF A CORRECTIVE ACTION INSPECTION AT THE SMITH TRUCKING FACILITY

APPENDIX C
CASE STUDY OF A CORRECTIVE ACTION INSPECTION AT THE SMITH TRUCKING FACILITY

The following case study documents the activities and results of a corrective action inspection at a hypothetical facility that is performing a RCRA facility investigation (RFI). It illustrates many of the fundamental procedures that were discussed in the guidance manual. This case study does not describe an actual facility. Rather, it is based on information about a number of inspections at facilities throughout the country.

This case study is divided into four major subsections. Section C.1 provides background information about the facility being inspected. Section C.2. provides information on the activities performed and the products developed during the planning phase of the inspection. Section C.3 describes the activities performed and information collected during the inspection at the facility, in the form of a field logbook used by the inspection team. Section C.4 contains the inspection report that summarizes the activities and findings of the inspection.

C.1 FACILITY BACKGROUND

The following subsections include a description of the facility and a discussion of its RCRA compliance history, the applicable portions of its RFI work plan, and the current status of RFI activities.

C.1.1 Description of the Facility

The Smith Trucking Corporation (Smith Trucking) conducts automotive service operations. Operations at the facility include servicing of trucks and other vehicles. Waste paint thinner, an EPA waste code F005 hazardous waste, was stored at the facility in two underground waste storage tanks. The facility removed the tanks in 1985.

C.1.2 Corrective Action History of the Facility

A RCRA facility assessment (RFA) in 1986 determined that releases of hazardous waste and hazardous constituents had occurred or could have occurred at three solid waste management units (SWMU) at the facility. The SWMUs were the locations of two former underground waste storage tanks and a bay at which wastes from the tanks were loaded into trucks. Constituents of the paint thinner were found in the surface and subsurface soil and the groundwater beneath the facility during the sampling visit for the RFA.

Representatives of Smith Trucking signed a consent order with EPA in 1987 to address contamination that resulted from past releases. The consent order required the facility to complete an RFI under the authority of Section 3008(h) of RCRA. In May 1987, under the conditions of the order, the facility submitted an RFI work plan to EPA for approval. Later in 1987, the facility began field investigations under the approved work plan. The activities included a soil gas survey, drilling of soil borings, installation of groundwater monitoring wells, sampling of groundwater, aquifer testing, and management procedures for investigation-derived wastes. In October 1988, Smith Trucking submitted to EPA an RFI report that summarized the results of the activities.

After reviewing the October 1988 RFI report, EPA developed a list of deficiencies in the RFI. Although the extent of soil contamination at the locations of the two former underground waste storage tanks had been defined, EPA determined that information on soil contamination at the truck bay was inadequate. From the results of aquifer testing, EPA determined that additional investigation of upper portions of the deep bedrock aquifer and its hydrological relationship with the shallow bedrock aquifer was needed.

The facility addressed the deficiencies in a supplemental RFI work plan submitted to EPA in July 1990. EPA approved the supplemental RFI work plan in August 1990.

C.1.3 Summary of the Supplemental RFI Work Plan

Activities to be conducted under the July 1990 RFI work plan included:

- Drilling of additional soil borings to characterize the thickness of the overburden in the area of the truck bay and to define the extent of contamination there
- Installation of bedrock cluster monitoring wells in the vicinity of the former underground waste storage tanks
- Performance of additional aquifer tests in the shallow bedrock system and the deep bedrock aquifer to obtain further information on hydrogeologic characteristics of the aquifer
- Additional groundwater sampling to complete the definition of the extent of groundwater contamination.

C.1.4 Status of RFI Activities at the Time of the Inspection

Implementation of the approved RFI work plan addendum was scheduled to begin in October 1990. According to the facility's monthly progress report submitted on October 15, 1990, field crews were scheduled to start drilling soil borings and installing bedrock cluster monitoring wells during the week of October 22, 1990.

C.2 PREPARING FOR THE INSPECTION

The following subsections describe the steps involved in preparing for the inspection at the Smith Trucking facility. The steps include: (1) developing the pre-inspection worksheet; (2) reviewing the background information on the facility; (3) defining the purpose and scope of the inspection; (4) assembling the inspection team; and (5) developing the inspection plan and inspection checklist.

C.2.1 Pre-Inspection Worksheet

The pre-inspection worksheet can be found on the following pages (see Figure D-1).

C.2.2 Reviewing the Background Information

The background information to be reviewed follows:

- RFA report (1986)
- Consent order (1987)
- RFI work plan (May 1987)
- RFI report (October 1988)
- Supplemental RFI work plan (July 1990)
- Recent monthly progress reports developed by the facility
- The most recent compliance evaluation inspection (CEI) report from the State of Missouri.

C.2.3 Defining the Purpose and Scope of the Inspection

The purpose of the corrective action inspection of Smith Trucking is to evaluate the facility's compliance with the schedule and procedures specified in the facility's July 1990 RFI work plan and addendum and with the reporting requirements specified in the 1987 consent order. The scope of the inspection would be to evaluate procedures and documentation related to:

- Procedures for soil boring and drilling and installation of monitoring wells
- Procedures for logging drilling cores
- Procedures for decontaminating drilling and installation equipment

- Procedures for well development
- Procedures for the collection and preservation of samples and for quality assurance and chain of custody
- Procedures for aquifer testing
- Management of investigation-derived wastes
- Groundwater sampling to adequately define the extent of groundwater contamination
- Compliance with schedules for conducting supplemental RFI activities
- Health and safety procedures.

C.2.4 The Inspection Team

The following individuals make up the inspection team:

- Frank Stanfield, Environmental Engineer, EPA Region 7, Lead Inspector
- Sandra Doyle, Geologist, EPA Region 7, Field Inspector
- David Johnson, Environmental Scientist, Missouri Department of National Resources (MDNR), Field Inspector.

C.2.5 Inspection Plan and Checklist

The facility-specific inspection plan and the facility-specific inspection checklist can be found on the following pages (see Figures C-2 and C-3).

C.3 CORRECTIVE ACTION ON-SITE INSPECTION ACTIVITIES

This section describes the activities conducted by the inspection team during the corrective action inspection at Smith Trucking. The information is presented in the form of notes from Mr. Stansfield's field logbook (see Figure C-4).

C.4 CORRECTIVE ACTION INSPECTION REPORT

The inspection team prepared a corrective action inspection report based on the results of the inspection. (See Figure C-5).

Figure C-1: Pre-inspection Worksheet for Corrective Action Inspection at Smith Trucking

Task Performed		Pre-inspection Task
Y	N	Contact/coordinate with Regional and State offices
Y	N	- Region 7 project coordinator
Y	N	- Missouri DNR
Y	N	Obtain background information
Y	N	- Corrective action order
Y	N	- RFI work plans
Y	N	- RFI reports
Y	N	- Monthly progress reports
Y	N	- SAP
Y	N	- QAPP
Y	N	- Health and safety plan
Y	N	- RFA report
Y	N	Review background information
Y	N	Define scope of inspection
Y	N	Assemble inspection team
Y	N	Develop inspection plan
Y	N	- Notify facility
Y	N	- Develop plan for opening meeting
Y	N	- Develop procedures for review of documents

Figure C-1: Pre-inspection Worksheet for Corrective Action Inspection at Smith Trucking (continued)

Task Performed	Pre-inspection Task
Y N	- Finalize on-site procedures
Y N	- Identify elements of closing meeting
Y N	Prepare inspection checklist
Y N	Identify and obtain equipment

Figure C-2 - RFI Inspection Plan

INSPECTION PLAN
THE SMITH TRUCKING CORPORATION

Objectives

- Observe investigation procedures and compliance with approved RFI work plans
- Observe sampling techniques
- Observe management of investigation-derived wastes
- Observe schedules for conducting supplemental RFI activities
- Observe health and safety procedures

Background

The Smith Trucking Corporation (Smith Trucking) conducts automotive service operations. Operations at the facility include servicing of trucks and other vehicles. Waste paint thinner, an EPA waste code F005 hazardous waste, was stored at the facility in two underground waste storage tanks. The facility removed the tanks in 1985. A RCRA facility assessment (RFA) in 1986 determined that releases of hazardous waste and hazardous constituents had occurred or could have occurred at three solid waste management units (SWMU) at the facility. The SWMUs were the locations of two former underground waste storage tanks and a bay at which wastes from the tanks were loaded into trucks. Constituents of the paint thinner were found in the surface and subsurface soil and the groundwater beneath the facility during the sampling visit for the RFA.

Representatives of Smith Trucking signed a consent order with EPA in 1987 to address contamination that resulted from past releases. The consent order required the facility to complete an RFI under the authority of Section 3008(h) of RCRA. In May 1987, under the conditions of the order, the facility submitted an RFI work plan to EPA for approval. Later in 1987, the facility began field investigations under the approved work plan. The activities included a soil gas survey, drilling of soil borings, installation of groundwater monitoring wells, sampling of groundwater aquifer testing and management procedures for investigation-derived wastes. In October 1988, Smith Trucking submitted to EPA an RFI report that summarized the results of the activities.

After reviewing the October 1988 RFI report, EPA developed a list of deficiencies in the RFI. Although the extent of soil contamination at the locations of the two former underground waste storage tanks had been defined, EPA determined that information on soil contamination at the truck bay was inadequate. From the results of aquifer testing, EPA determined that additional investigation of upper portions of the deep bedrock aquifer and its hydrological relationship with the shallow bedrock aquifer were needed. The facility addressed the deficiencies in a supplemental RFI work plan submitted to EPA in July 1990. EPA approved the supplemental RFI work plan in August 1990.

Tasks

Inspection objectives will be addressed by:

- Compiling and reviewing EPA and/or State facility files

- Meetings with appropriate personnel (inspection team members, project manager, OSC, management)

- Conducting an on-site inspection.

Figure C-2 - RFI Inspection Plan (continued)

The inspection team and project coordinator met on September 10, 1990. The on-site inspection is scheduled to begin on October 29, 1990. The on-site inspection will include:

- Discussion of current corrective action activities being conducted with facility personnel
- Observation of investigation procedures, management of investigation-derived wastes, and schedules for conducting supplemental RFI activities
- Observation of health and safety procedures
- Closing meeting with facility.

Health and Safety Procedures

Health and safety procedures to be followed during the on-site inspection will comply with those described in the attached Health and Safety Plan.

Quality Assurance Project (QAPP) and Sampling Analysis Plan

The SAP and QAPP procedures to be followed during the on-site inspection will comply with those described in the attached SAP and QAPP plan.

Resources

- EPA geologist
- State environmental scientist.

Equipment needs include: hard hat, safety glasses, two cameras and film, calculator, coveralls, pH paper, sample containers, tape, mini ram (particulate monitor), organic vapor monitor (PID, FID), rubber boots, tape measures, compass, safety gloves, safety boots, safety shoes, ice chest, flashlight, notebook, pens and markers, ear plugs, and respirator.
Paperwork needs include: facility files, reference information, credentials, business cards, CBI forms, and regulations (Federal and state).

Schedules

September 10, 1990	EPA Region 7 will notify XYZ Company (Smith Trucking's agent for implementing the RFI plan) of scheduled inspection (verbally and in writing)
September 12, 1990	EPA Region 7 will notify Smith Trucking of scheduled inspection (verbally and in writing)
October 29, 1990	Initiate on-site inspection
November 5, 1990	Draft report to project manager

Figure C-3: RFI Inspection Checklist for Smith Trucking

	Yes	No	Comments
1. Drilling and Sampling Soil Boring Procedures			
a. 36 soil borings were advanced to bedrock using a 6-inch I.D. hollow-stem auger rig.	☐	☐	______
b. Soil samples were collected with 3-inch diameter split-barrel continuous samplers in an acetate liner, which was 5 feet in length.	☐	☐	______
c. Soil samples were collected at depths of 6, 16, 26, and approximately 40 feet (bedrock).	☐	☐	______
d. A clean stainless steel knife was used to split the acetate liner.	☐	☐	______
e. A 10.0 electron volt lamp probe of a calibrated photoionization detector (PID) was slowly run down the length of the core. The highest PID reading was recorded in the boring log and a sample was collected at that location in addition to the ones at 6, 16, 26, and 40 feet.	☐	☐	______

Figure C-3: RFI Inspection Checklist for Smith Trucking

f. The soil samples were placed into the sterile glass sample containers: two 40-Ml vials for VOCs; one 8-oz wide mouth glass jar each for metals and semivolatile organics. ☐ ☐ ____________

g. Sampling personnel wore disposable latex gloves during screening and sampling activities. These gloves were changed at each boring location. ☐ ☐ ____________

h. All boring equipment was decontaminated by steam cleaning prior to each use. All boring flights were decontaminated between borings. ☐ ☐ ____________

i. All sampling equipment was decontaminated by washing with a laboratory-grade, phosphate-free, detergent/ distilled water solution and was rinsed three times with distilled water. ☐ ☐ ____________

j. VOC samples were collected and packed first. The remaining sample containers were filled from sample material representing the entire sample material which was thoroughly homogenized. ☐ ☐ ____________

Figure C-3: RFI Inspection Checklist for Smith Trucking

k. All samples were immediately stored in ice-packed, insulated coolers for shipment to the laboratory.	☐	☐	____________
l. A chain-of-custody form was filled out and accompanied the samples during shipment and delivery to its laboratory.	☐	☐	____________
m. Trip blanks were provided by the laboratory and accompanied all coolers containing soil samples to be analyzed for VOCs; the trip blank was to be analyzed for VOCs.	☐	☐	____________
n. The sampling equipment rinsate samples were collected once daily. Each rinsate sample was to be analyzed for VOCs, semivolatile organics, and metals.	☐	☐	____________
o. Blind duplicate samples were collected at the same time, in the same manner, in the same type of container, preserved in the same way and analyzed by the same laboratory and for the same constituents as its primary sample.	☐	☐	____________

Figure C-3: RFI Inspection Checklist for Smith Trucking

p. A replicate sample was collected at 5% of its total number of locations sampled and analyzed for all parameters analyzed for the corresponding sample.	☐	☐	________
q. The core was logged on boring log sheets following sampling of the core.	☐	☐	________
r. Soil borings were backfilled with a cement/bentonite slurry.	☐	☐	________
s. Drill cuttings were placed in yellow barrels labeled "HAZARDOUS WASTE - Solid."	☐	☐	________
t. A plastic sheet was placed under the racks where the split barrel samplers were being opened. Pieces of soil cores that fell on this plastic sheet were disposed of with drill cuttings.	☐	☐	________
u. The borings were arranged in a grid with six borings per side and spaced on 80-foot centers.	☐	☐	________
v. All work was performed under the supervision of a qualified geologist who logged the boring based on an examination of cuttings, cores, and PID readings.	☐	☐	________

Figure C-3: RFI Inspection Checklist for Smith Trucking

w. The breathing zone of the XYZ personnel was monitored with the PID. If the PID read concentrations of organics greater than 5 ppm, the personal protective equipment specified by the health and safety plan was used. The PID reading in the breathing zone was recorded on the boring log. ☐ ☐ ____________

2. Monitoring Well Installation Procedures

a. Seven, two-well clusters were installed at the locations specified in the RFI work plan. ☐ ☐ ____________

b. Wire-line coring equipment was used to drill boreholes. The second hole was drilled using an 8-inch tri-core roller bit to its desired depth. ☐ ☐ ____________

c. The shallow wells were drilled to a depth of 50 feet below ground surface. ☐ ☐ ____________

d. The deep wells were drilled to a depth of 150 feet below ground surface. ☐ ☐ ____________

Figure C-3: RFI Inspection Checklist for Smith Trucking

e. A ten-foot-long, 4-inch diameter, 20 slot polyvinyl chloride PVC well screen was used for the shallow string. A five-foot-long 2-inch diameter, 20 slot PVC well screen was used in the deep core hole.	☐	☐	________
f. The deep and shallow strings were separated by a minimum of two feet of bentonite pellets.	☐	☐	________
g. A PVC bottom cap was placed on each well prior to installation.	☐	☐	________
h. Both the deep and shallow wells were constructed of PVC casing, which was the same diameter as the well screen, to the ground surface. A sand pack was emplaced to a depth of at least two feet above the top of the screen and was topped by approximately 2 feet of bentonite pellets. A cement grout was placed on top of the pellets and trimmed to the ground surface. Each well was finished with a lockable protective casing and a sloping concrete pad.	☐	☐	________
i. The downhole drilling equipment was thoroughly steam cleaned.	☐	☐	________

Figure C-3: RFI Inspection Checklist for Smith Trucking

j. Once the monitoring wells were complete the vertical and horizontal coordinates of the wells were surveyed in reference to a USGS datum. The top of the PVC where the elevation was determined was permanently marked. ☐ ☐ ____________

k. All work was performed and the supervision of a qualified geologist who logged the wells based on examination of cores and cuttings.

3. Monitoring Well Sampling Procedures

a. Immediately after the well cap was unlocked and removed, the off gases from its well were tested with a calibrated PID. ☐ ☐ ____________

b. Either three liquid well volumes of water was purged from each well or the well was bailed dry prior to sampling. The amount of water bailed was recorded on well data sheets. ☐ ☐ ____________

Figure C-3: RFI Inspection Checklist for Smith Trucking

c. The pH meter was calibrated with standard buffer solution of pH 7 at each well site prior to sampling. Before each day in which samples would be taken, the pH meter was calibrated using buffer solutions of pH 4, 7, and 10. These calibrations were recorded on well data sheets. ☐ ☐ ____________________

d. Temperature, specific conductance, and pH were monitored during well purging and recorded on well data sheets. ☐ ☐ ____________________

e. The breathing zone of the sampler was periodically monitored during purging and sampling of the well. If the PID read concentrations of organics greater than 5 ppm, the personal protective equipment specified by the health and safety plan was used. The higher PID readings from the well and breathing zone were recorded on well data sheets. ☐ ☐ ____________________

f. The dedicated sample bailer was rinsed with distilled water before use and laid on clean aluminum foil or plastic. This rinse water was containerized with the purge water. ☐ ☐ ____________________

Figure C-3: RFI Inspection Checklist for Smith Trucking

g. The purge water and rinse water were placed in yellow barrels labeled "HAZARDOUS WASTE - Groundwater." ☐ ☐ ____________

h. The bailer was eased gently into the groundwater when collecting the VOC samples to reduce agitation and loss of VOCs. VOC samples were collected first. The semivolatile organics and metals sample containers were filled next. ☐ ☐ ____________

i. The samples were properly preserved in accordance with the following: (1) hydrochloric acid was added to VOC samples, (2) nitric acid was added to metal samples, and (3) all samples were immediately stored in repacked insulated coolers for shipment to the laboratory. ☐ ☐ ____________

j. A chain-of-custody form was filled out and accompanied the samples during shipment and delivery to the laboratory. ☐ ☐ ____________

Figure C-3: RFI Inspection Checklist for Smith Trucking

k. The groundwater collected from each well were analyzed for VOCs, semivolatile organics, and metals (SW-846 methods 8240, 8270, and 6010, respectively). The sample containers that were specified in the work plan were used.	☐	☐	________
l. Sampling personnel wore disposable latex gloves during screening and sampling activities. These gloves were changed at each monitoring well.	☐	☐	________
m. Trip blanks were provided by the laboratory and accompanied all coolers containing water samples to be analyzed for VOCs; the trip blank was to be analyzed for VOCs.	☐	☐	________
n. The sampling equipment rinsate samples were collected once daily. Each rinsate sample was to be analyzed for VOCs, semivolatile organics, and metals.	☐	☐	________
o. Blind duplicate samples were collected at the same time, in the same manner, in the same type of container, preserved in the same way, and analyzed by the same laboratory and for the same constituents as its primary sample.	☐	☐	________

Figure C-3: RFI Inspection Checklist for Smith Trucking

p. A replicate sample was collected at 5% of its total number of locations sampled and analyzed for all parameters analyzed for in the corresponding sample. ☐ ☐ ____________________

4. <u>Record Review</u>

a. The facility maintains the hazardous waste manifests for the past 3 years for wastes generated by the RFI. ☐ ☐ ____________________

b. The facility maintains all logs for soil borings and well installations for RFI activities. ☐ ☐ ____________________

c. The facility maintains all required records associated with health and safety provisions of the RFI work plan. ☐ ☐ ____________________

d. The facility maintained all RFI documents specified in paragraphs 75 through 80 of the 1987 consent order. ☐ ☐ ____________________

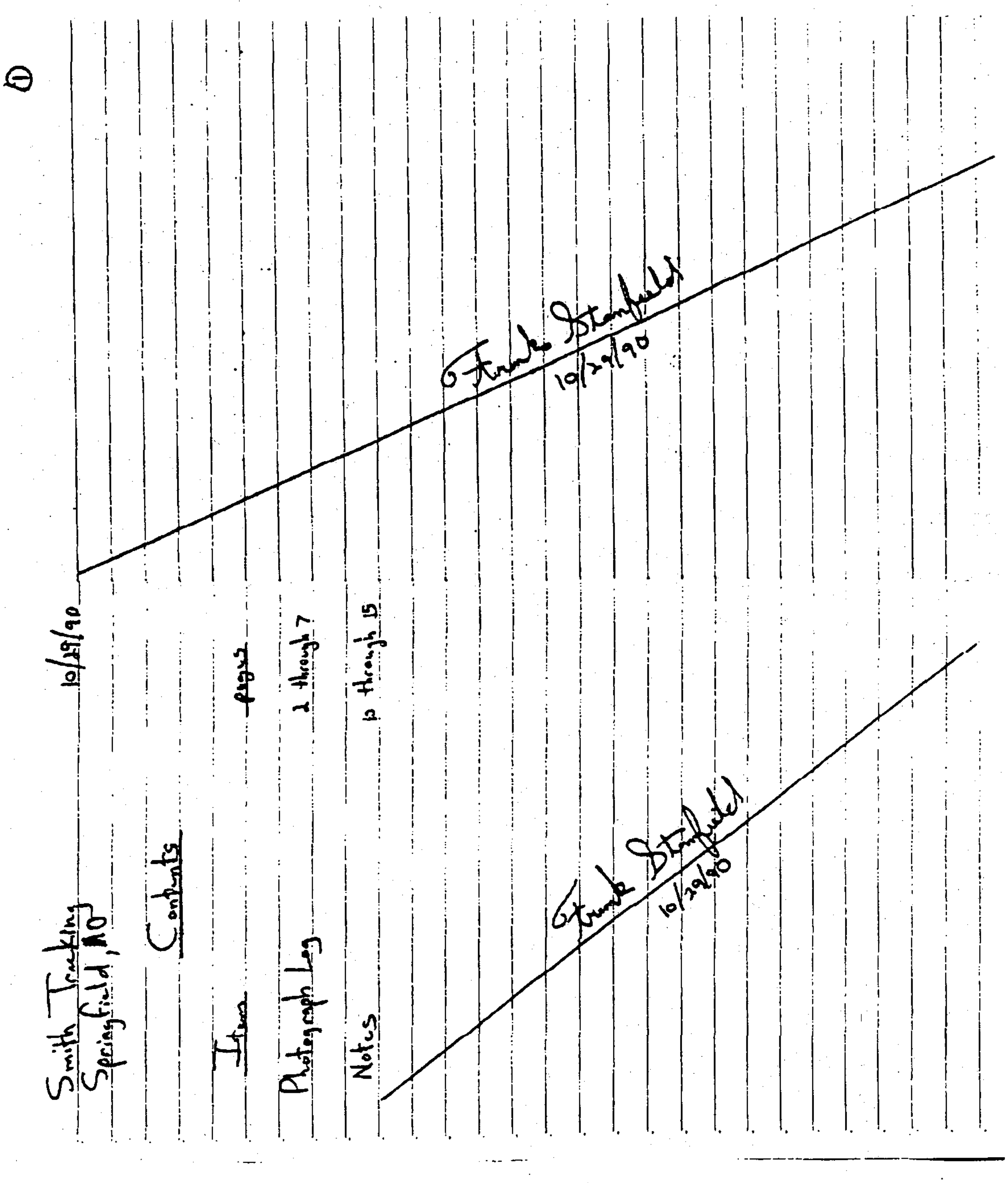
e. The RFI was proceeding in accordance with the schedule specified in the RFI work plan. ☐ ☐ ____________________

Figure C-3: RFI Inspection Checklist for Smith Trucking

5. Health and Safety

a. All persons involved in the RFI had read the health and safety plan and signed and dated a certification to that effect.	☐	☐	____________
b. All persons involved in the RFI had completed 40-hour Occupational Health and Safety Act (OSHA) health and safety training (29 CFR 1910.120(e)).	☐	☐	____________
c. Safety zones were established around drill rigs and properly flagged.	☐	☐	____________
d. A calibrated PID was used to monitor the breathing zone of XYZ personnel conducting invasive activities.	☐	☐	____________
e. All persons involved in the RFI were involved in a medical surveillance program that was required in the RFI work plan.	☐	☐	____________
f. The personal protective equipment specified in the work plan was worn by all personnel.	☐	☐	____________

Figure C-4: Field Logbook Notes for Corrective Action Inspection of Smith Trucking



1

Smith Trucking
Springfield, MO 10/29/90

Contents

Items pages
Photograph Log 2 through 7
Notes 13 through 15

Frank Stanfield
10/29/90

Frank Stanfield
10/29/90

Figure C-4: Field Logbook Notes for Corrective Action Inspection of Smith Trucking

②

Smith Trucking
Springfield, MO

10/29/90

③

Smith Trucking
Springfield, MO

10/29/90

Photograph Log

Roll #1, 36 exposures Kodak Gold 200

Photo No.	Time	Photographer	Direction / Subject	
1	0930	FS	S/	Soil boring (SB)-11 location. The PID reading was 2ppm in the breathing zone. The PID reading @ 3 ft deep and 10 ft deep registered 15 ppm and 7 ppm respectively. SWMU 3 - Truck Bay is shown in the background.
2	0949	FS	S/	Drum area is shown in foreground and SWMU 3 - Truck Bay is shown in the background. XYZ personnel are decontaminating one of four split-barrel samplers, which are being used to collect samples associated w/ soil borings.
3	10:35	FS	NW/	Installation of MW-6. XYZ representative, Kevin Douglas, is shown on the right providing oversight of the well installation. The drilling contractor, ABC Downhole, is shown using HQ wireline coring equipment to drill the deep well of a two well cluster.
4	10:50	FS	SW/	Soil boring SB-12 location. This photo shows XYZ personnel wearing air purifying respirators as specified in the H&S Plan because the PID registered 10ppm in

Figure C-4: Field Logbook Notes for Corrective Action Inspection of Smith Trucking

(4)

Smith Trucking 10/29/90
Springfield, MO

Photograph Log - (Continued)
Roll #1 (continued)

Photo No.	Time	Photographer	Direction / Subject
5	11:05	FS	S / SB-12
6	11:20	FS	S / ~~SB-12~~
7	11:45	FS	S/Storage Area

Frank Steinfield 10/29/90

(5)

Smith Trucking 10/29/90
Springfield, MO

~~seation~~. A split-barrel sampler is shown with brass sleeves that were used to collect soil samples. These brass sleeves were used because the XYZ crew ran out of the acetate liners specified in the RFI workplan. Note that the are being sealed with plastic caps and silicone tape on each end, for use as a sample containers. Brass sleeves were not specified as sample containers in the RFI workplan.

FS STET
~~rotation~~ An XYZ sampler is shown a brass sleeve in the same maner as described above to collect a sample at 4 ft deep where the highest PID reading of 45 ppm occurred.
Note the peices of soil core on the unprotected ground.

~~or~~ investigation derived waste. Note that decontamination water is being placed in yellow drums labeled "Hazardous Waste -- Solid" and soil cuttings being placed in red drums marked "Hazardous Waste - Liquid"

Frank Steinfield 10/29/90

Figure C-4: Field Logbook Notes for Corrective Action Inspection of Smith Trucking

6

Smith Trucking
Springfield, MO

Photograph Log (Continued)
Roll #1 (Continued)

Photo No.	Time	Photographer	Direction / Subject
8	19:55	FS	N / MW-6

Frank Steinfeld
10/29/90

7

10/29/90 Smith Trucking
Springfield, MO

10/29/90

location. Completed well; note that the well was not grouted all of the way to the top. It appears that there is about five feet of the hole left to be grouted

Frank Steinfeld
10/29/90

Figure C-4: Field Logbook Notes for Corrective Action Inspection of Smith Trucking

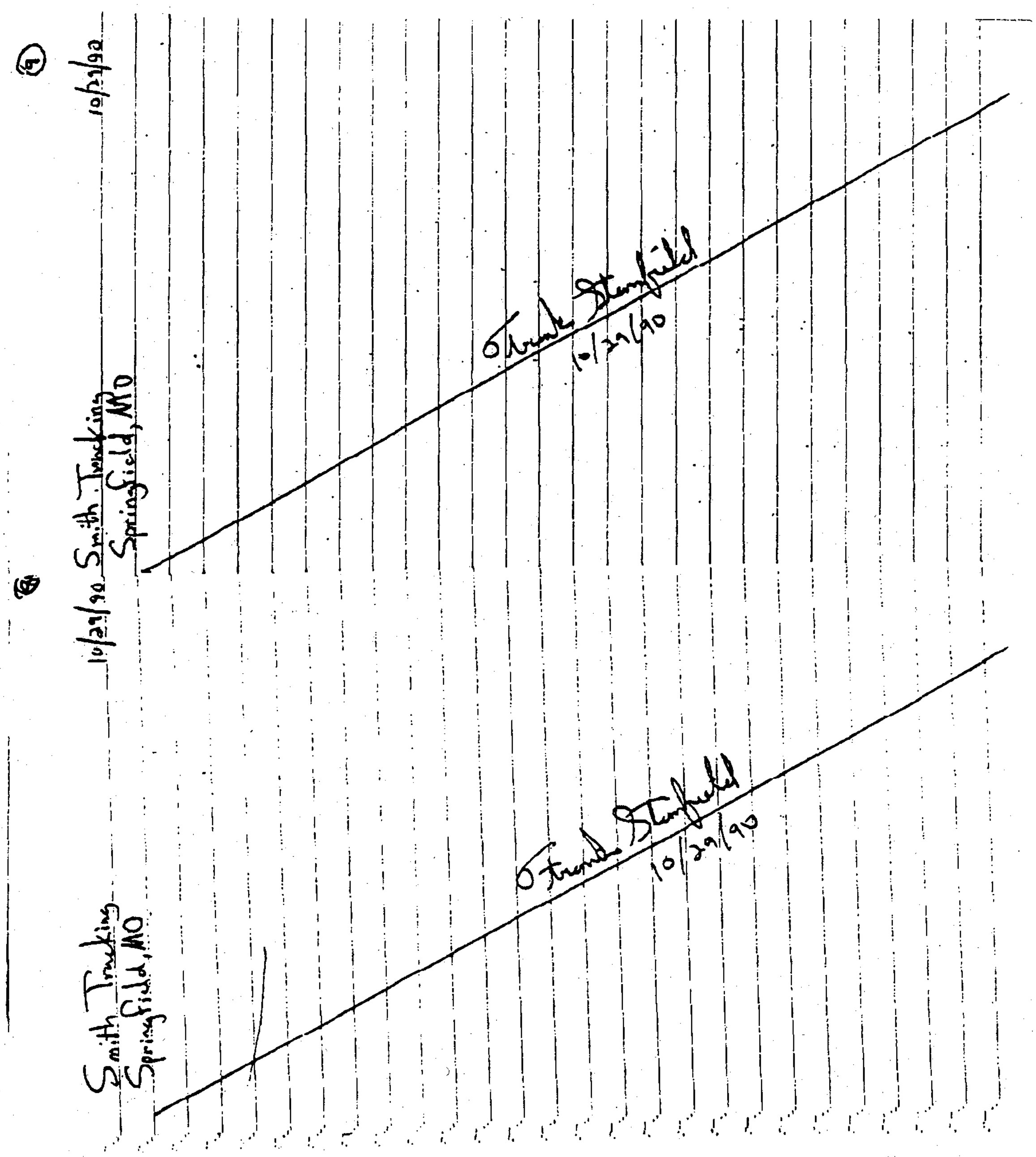


Figure C-4: Field Logbook Notes for Corrective Action Inspection of Smith Trucking

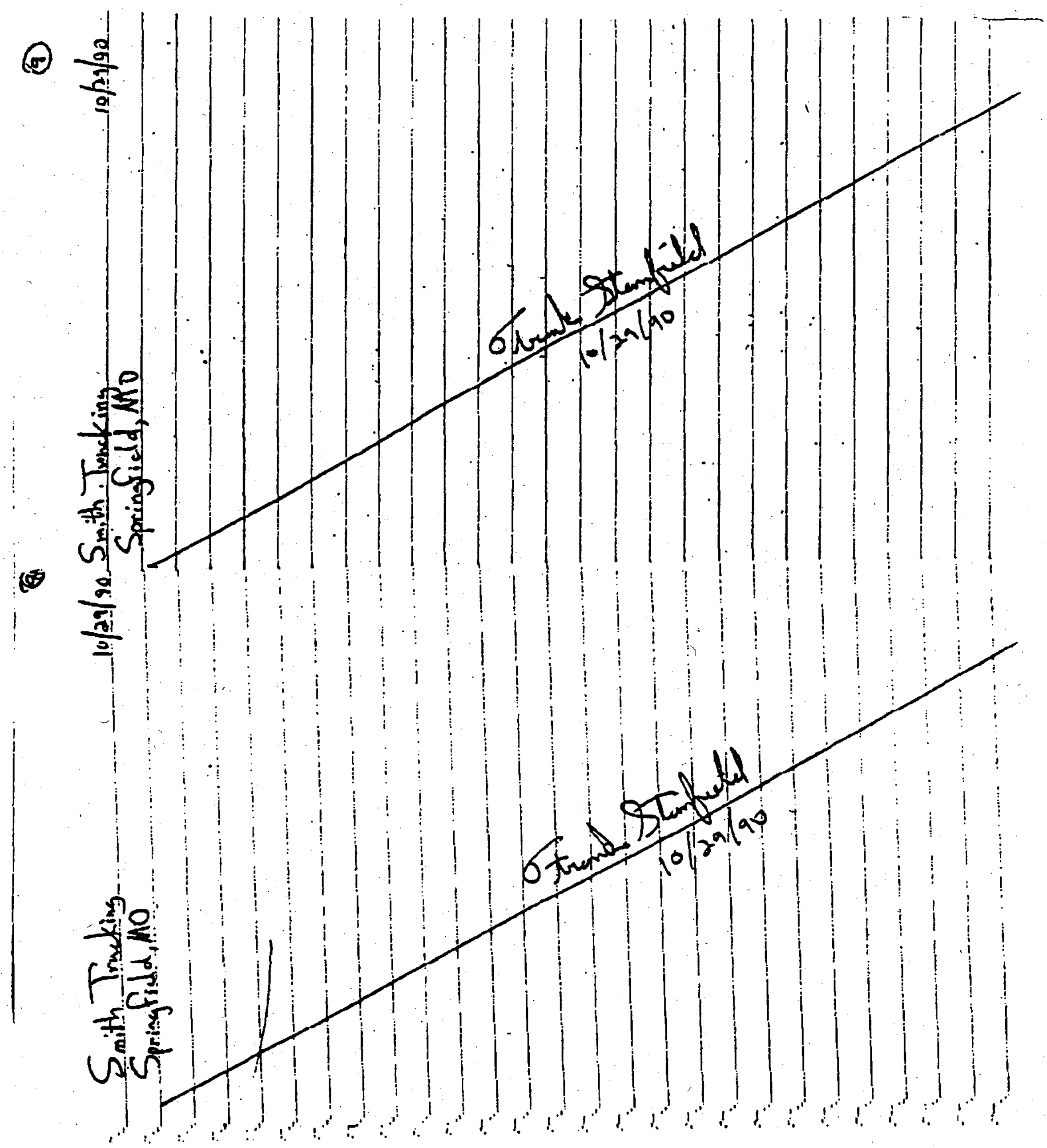


Figure C-4: Field Logbook Notes for Corrective Action Inspection of Smith Trucking

(10)

Smith Trucking
Springfield, MO
10/21/90

07:58 We arrived @ the facility. The weather conditions are partly cloudy; 52°F; wind SSE 5 to 10 mph.

0800 We checked in @ the guard house. As we signed in the guard contacted Roy Holland, Smith's Envir. and H+S officer.

0810 Mr. Holland met us at the guardhouse and escorted us to a conference room in the plant building where Kevin Douglas, Supervisor of XYZ Contractors was waiting.

0815 We presented Mr. Holland w/ our credentials and explained that we were here to conduct a corrective action oversight inspection (CAOI). I informed Mr. Holland that EPA has the authority to conduct this inspection as granted by Section 3007 of RCRA and as specified in the Corrective action consent order.

[signature] 10/21/90

(11)

Smith Trucking
Springfield, MO
10/21/90

I explained the purpose of the inspection, its scope and the agenda that was tentatively layed out.

I explained that the facility has the right to claim information provide during the CAOI as confidential business information (CBI) as long as it meets the criteria listed on page 1 of the CBI forms. He signed these forms and waived the facilities right to claim CBI during this inspection.

I asked if there were any personal safety considerations that we need to be aware of. Mr. Holland said that only those identified in the site Health and safety plan were in effect. He said that we were require to read that plan and sign a certification form that we understood it. I told Mr. Holland that we had already read that H+S Plan. We sign the Health and safety certificate form.

[signature] 10/21/90

Figure C-4: Field Logbook Notes for Corrective Action Inspection of Smith Trucking

(12)

Smith Trucking 10/29/90
Springfield, MO

0910 Mr. Douglas informed us that the soil boring, well installation and groundwater sampling were currently going on simultaneously. We left the conference room. I went to oversee the soil boring investigation. Sandra Dogle, EPA Geologist went to observe the monitoring well installation and David Johnson, MDNR Environmental Scientist went to observe the groundwater sampling. We each had separate logbooks to record our observations.

0930 I observed XYZ personnel at SB-11. They were collecting soil samples. See photolog for further info.

0950 XYZ personnel completed SB-11 and proceeded to the decon area to decon the four split barrel sampler that they were using.

(13)

Smith Trucking 10/29/90
Springfield, MO
(See photolog for further info),

1010 Began boring SB-12.

1030 Sandra Dogle requested that I take a photograph of the installation of monitoring well (MW-6).

1045 Returned to SB-12. No deviations from RFI workplan noted.

11:05 The XYZ personnel informed me that they had run out of acetate liners for the split barrel sampler. They asked me if they could use brass sleeves to collect samples instead. I informed Mr. Holland that I was not authorized to make that determination, and that he must contact the EPA project manager, Marilyn Black for approval. Mr. Holland attempted to contact Ms. Black but was not able to reach her. He decided to go ahead and use the brass sleeves.

10/29/90 Frank Stanfield

Figure C-5: Corrective Action Inspection Report for Smith Trucking

RCRA CORRECTIVE ACTION INSPECTION REPORT

SMITH TRUCKING
EPA ID NUMBER MOD999999999
10201 WEST 119TH STREET
SPRINGFIELD, MISSOURI 66666

Prepared for

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October 29, 1990

Figure C-5: Corrective Action Inspection Report for Smith Trucking (continued)

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Appendices

A Photographic Log **(not provided in case study)**

B Inspection Checklist **(provided in Figure D-3; completed checklist is not provided in case study)**

C Inspection field logbook notes **(provided in Figure C-4 of case study)**

D Confidential business information claim forms **(not provided in case study)**

E Monitoring well completion diagrams **(not provided in case study)**

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1.0 GENERAL INFORMATION

PURPOSE AND SCOPE OF INSPECTION: Evaluate the facility's compliance with the schedules and procedures specified in the facility's July 1990, RCRA Facility Investigation (RFI) work plan and with the reporting requirements specified in the consent order, dated August 31, 1987. The inspection included observations of field activities and review of records.

FACILITY INFORMATION: Smith Trucking, 10201 West 119th Street, Springfield, Missouri 66666. EPA ID number is MOD999999999. Telephone number is (417) 555-1234. Figure 1 is a location map for the facility.

FACILITY REPRESENTATION: Roy Helland (Environmental and Safety Officer), and Devin Douglas (Supervisor of XYZ Contractors).

INSPECTION PARTICIPANTS: Frank Stanfield (EPA Environmental Engineer), Sandra Doyle (EPA Geolgist), and David Johnson (Environmental Scientist with the Missouri Department of Natural Resources (MDNR)).

INSPECTION DATE: October 29, 1990

2.0 FACILITY BACKGROUND

The facility conducts automotive service operations. Operations at the facility include servicing of trucks and other vehicles. As a result of such operations, paint thinner managed at the facility has been released into the surface and subsurface environments. Constituents of the paint thinner have been found in the soil and the groundwater beneath the facility. A RCRA facility assessment in 1986

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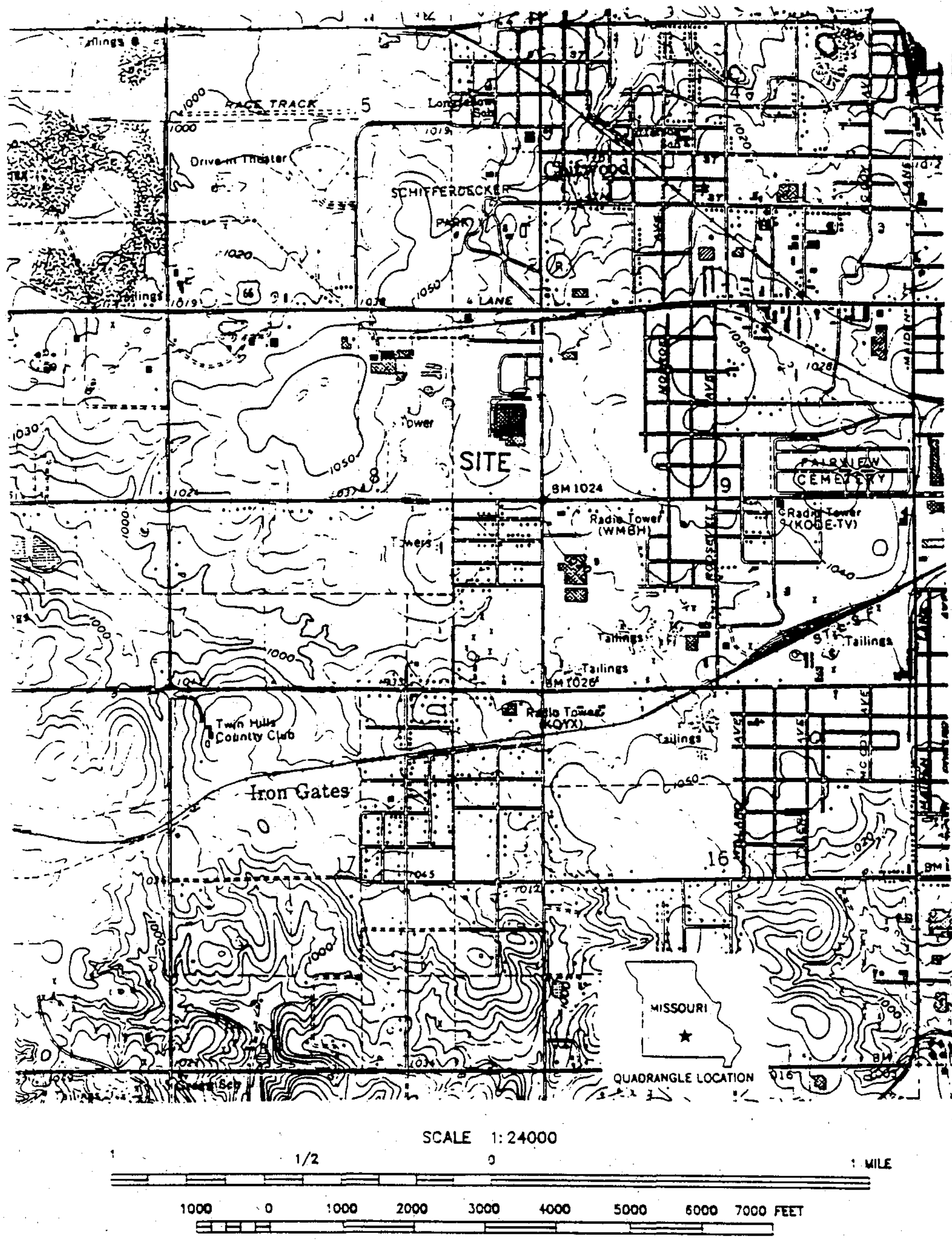

SMITH TRUCKING
SPRINGFIELD, MISSOURI

FIGURE 1
FACILITY LOCATION

determined that releases of hazardous waste and hazardous constituents had occurred or could have occurred at three solid waste management units at the facility. The units were the locations of two former underground waste storage tanks and a bay for the unloading of wastes from the underground storage tanks into trucks. The locations of the units are identified on Figure 2.

In 1987, the Smith Trucking facility signed a consent order with EPA to address contamination that resulted from past releases. Under the authority of Section 3008(h) of RCRA, the Consent Order required the facility to complete an RFI. In May 1987, under the conditions of the order, the facility submitted an RFI work plan to EPA for approval. The facility began field investigations under the approved work plan later in 1987. The activities included a soil gas survey, drilling of soil borings, installation of groundwater monitoring wells, groundwater positions, and subsequent aquifer testing. In October 1988, Smith Trucking submitted to EPA an RFI report that summarized the results of the activities.

After reviewing the October 1988 RFI report, EPA developed a list of deficiencies in the RFI. The facility addressed the deficiencies in a supplemental RFI work plan submitted to EPA in July 1990. EPA approved the supplemental RFI work plan in August 1990. Activities to be conducted under the approved work plan included:

- Drilling of additional soil borings to characterize the thickness of the overburden in the area of the truck bay and to define the extent of contamination there
- Installation of bedrock cluster monitoring wells in the vicinity of the former underground waste storage tanks
- Performance of additional aquifer tests in the shallow bedrock system and the deep bedrock aquifer to obtain further information on hydrogeologic characteristics of the facility
- Additional groundwater sampling to complete the definition of the extent of groundwater contamination

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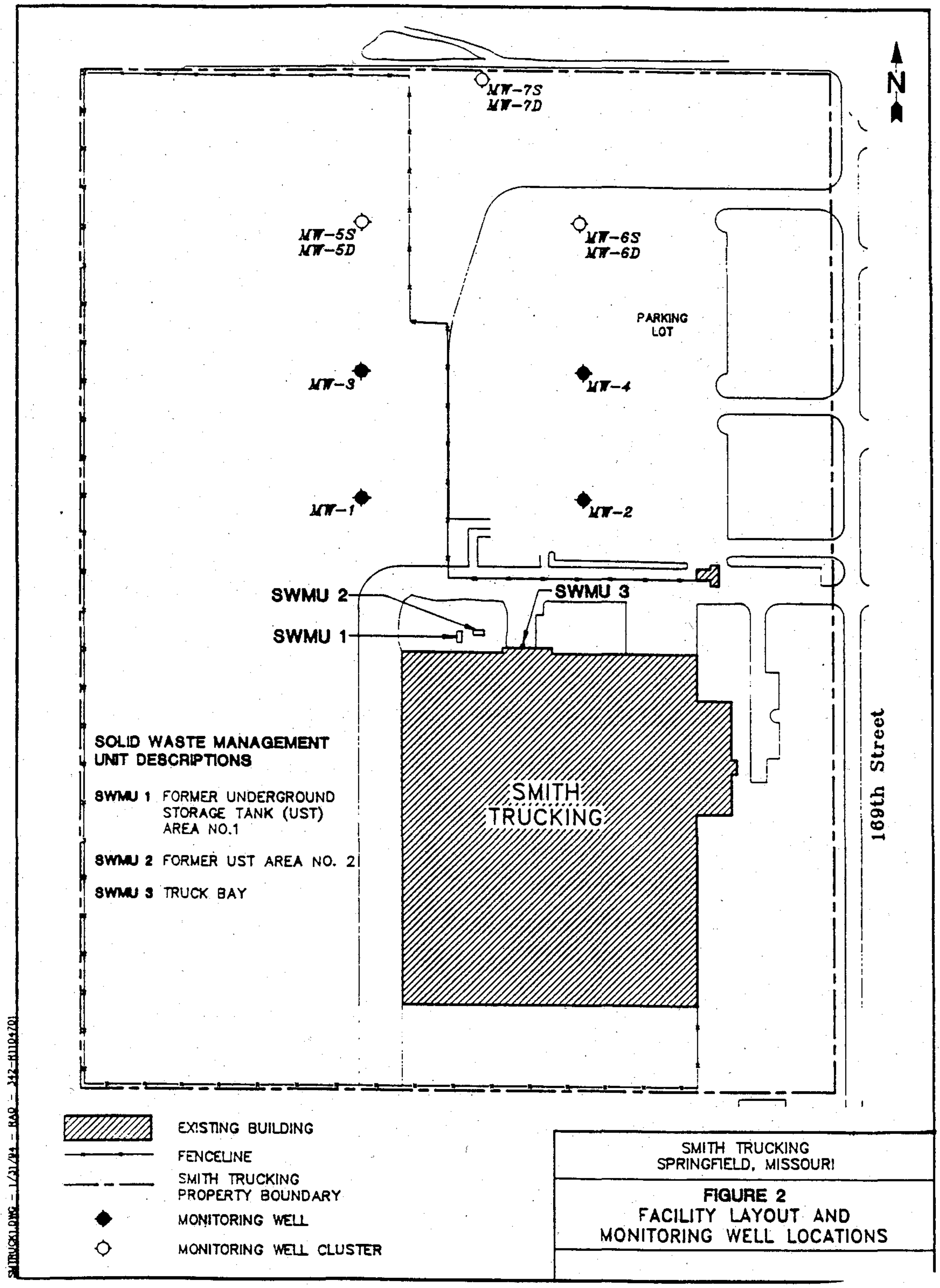
Figure C-5: Corrective Action Inspection Report for Smith Trucking (continued)



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3.0 SUMMARY OF INSPECTION

The following subsections summarize the inspection procedures used by EPA personnel, the status of corrective action activities at the facility at the time of the inspection, and a description of activities conducted by EPA personnel during the inspection.

3.1 INSPECTION PROCEDURES

At the request of WSTM personnel, the ENSV inspection team notified Smith Trucking of the inspection in advance to ensure that appropriate personnel would be available to represent the facility. Upon arrival at the facility, the inspection team contacted Mr. Roy Helland. Mr. Helland escorted the team to the main office at the facility. Mr. Douglas joined Mr. Helland at the office.

The inspection team introduced themselves, and Mr. Stanfield explained that the inspection was being conducted both under the authority of Section 3007 of RCRA and under the provisions of the consent order. Mr. Stanfield discussed the purpose of the inspection and the procedures that the inspection team would follow. Mr. Helland was informed that the facility had the right to claim information gathered during the inspection as confidential business information (CBI). Mr. Stanfield provided Mr. Helland with the CBI acknowledgement forms and a CBI claim form to be completed at the end of the inspection. Health and safety concerns at the facility were discussed, and the inspection team determined that the team's equipment was adequate to meet applicable requirements.

The inspection began with interviews of Mr. Helland and Mr. Douglas on the status of RFI activities at the facility. The inspection team also reviewed records kept by the facility for compliance with requirements of the work plan and the consent order. The inspection team then observed the facility's procedures for drilling soil borings, soil sampling, and decontaminating equipment. EPA personnel also evaluated the facility's procedures for installing cluster groundwater monitoring wells and for

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sampling the groundwater from other wells. At the end of the inspection, EPA personnel discussed the findings of the inspection. Mr. Helland signed the CBI acknowledgement and claim forms. No CBI claim was asserted. Copies of the completed forms are provided in Appendix D.

3.2 STATUS OF RFI ACTIVITIES

A total of 36 soil borings was specified in the July 1990 RFI work plan to further characterize the soils and the soil contamination at the truck bay. Ten of the borings had been completed. Additional borings were to be drilled on the day of the inspection to continue characterization of soils in the overburden and collection of samples from the soils to define the extent of contamination. The locations of all soil borings included in the July 1990 RFI work plan are shown in Figure 3.

The installation of seven monitoring well clusters at the facility had begun. The purpose of the monitoring well clusters was to provide information on piezometric head and permeability values within the bedrock aquifer. Five of the specified locations had been drilled before the date of the inspection. Mr. Helland stated that the facility had decided to install single deep wells at three of the five locations instead of the specified two-well clusters. At those locations, low water production and lack of fracturing had been observed in the upper 50 feet of bedrock aquifer. Therefore, the facility had concluded that the installation of the clusters, which were to monitor both the shallow and the deep portions of the bedrock aquifer, would not provide the needed information. Installation of clusters at the two remaining locations was scheduled for the day of the inspection.

The facility was completing a round of groundwater sampling specified in the July 1990 RFI work plan. All monitoring wells at the facility were scheduled to be sampled and analysis to be performed for volatile organic compounds (VOC) and inorganic compounds. The purpose of the analysis for VOCs is to aid in defining the extent of contamination. The purpose of analysis for inorganic compounds is to aid in determination of variations in the groundwater quality as a result of such

Figure C-5: Corrective Action Inspection Report for Smith Trucking (continued)

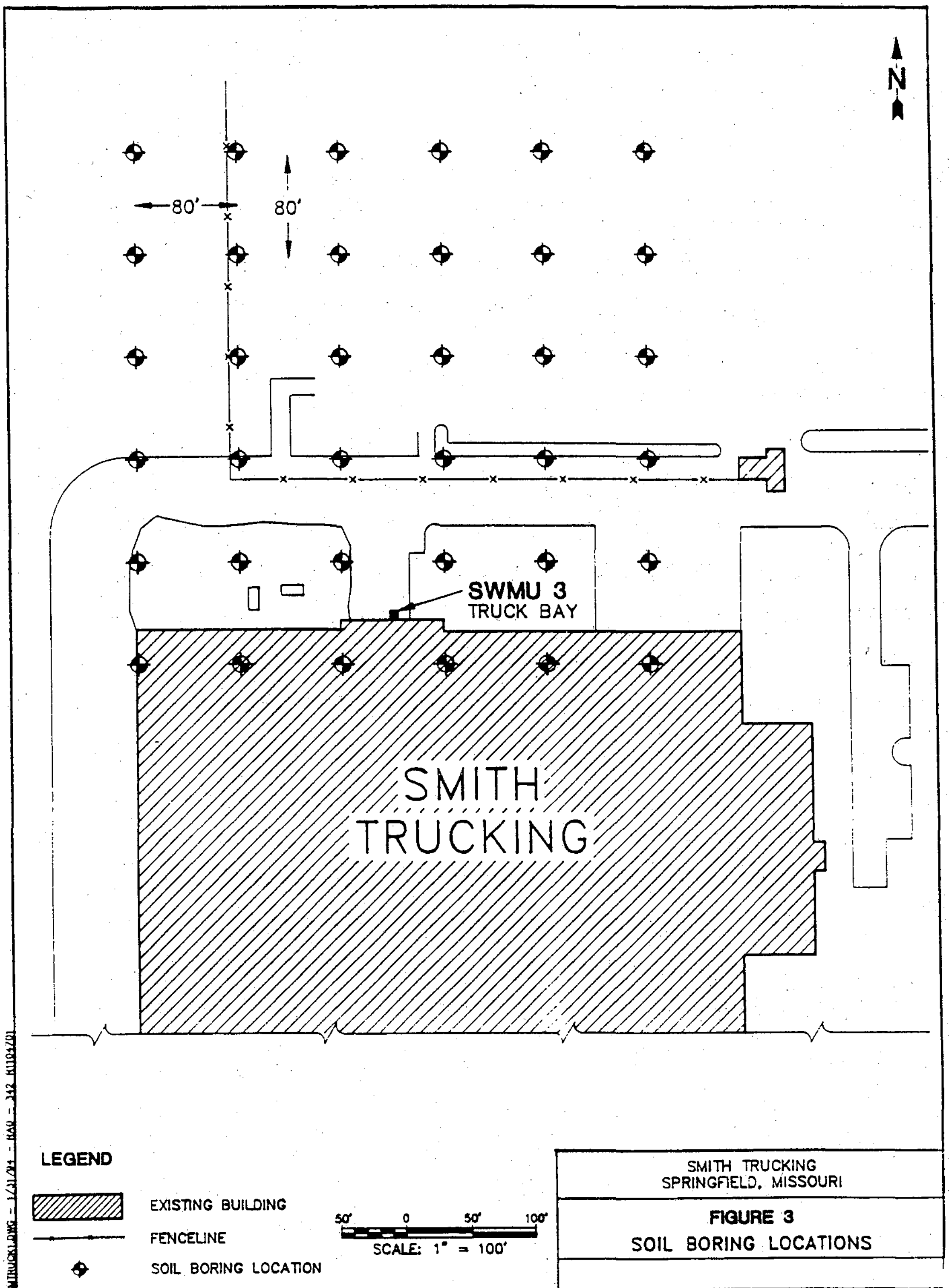

Figure C-5: Corrective Action Inspection Report for Smith Trucking (continued)

geological factors as mixing of groundwater from different geologic zones. Analysis for inorganic compounds also is intended to evaluate the applicability of air stripping technologies in which precipitation of inorganic species in column packing material present problems. Monitoring wells newly installed under the July 1990 RFI work plan were to be sampled after well development had been completed. At the time of the inspection, none of the wells were ready for sampling. Development of the wells was scheduled for the week following the inspection.

3.3 INSPECTION ACTIVITIES

During the review of records, EPA personnel looked at manifests for wastes generated by the RFI investigations, logs for soil borings and well installations performed under the July 1990 RFI work plan, and records associated with the health and safety provisions of the work plan. Manifests for the investigation-derived wastes generated as a result of the RFI appeared to be properly completed. Logs of soil borings and well installations appeared to have been completed properly. It also appeared that appropriate personnel had certified that they had read and signed the health and safety plan included in the RFI work plan.

EPA personnel compared information on the status of the RFI obtained from Mr. Helland and Mr. Douglas and from recent monthly status reports submitted by the facility with the schedule included in the July, 1990 RFI workplan. That information and observations of the status of RFI field work indicates that the facility appears to be in compliance with the schedule specified in the RFI work plan. No deviations from the reporting requirements of the consent order were found. Monthly progress reports submitted by the facility appear to accurately represent the progress of the RFI.

During the corrective action inspection, EPA personnel observed the drilling of five soil borings at the north end of the truck bay (SWMU 3). XYZ Contractors used a truck-mounted drilling rig equipped with a six-inch-inside-diameter hollow stem auger. The soil samples were collected with

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three-inch diameter split-barrel continuous samplers. The split-barrel samplers were each five feet in length. Brass sleeves were inserted in the split-barrel continuous samplers at depths of 6, 16, 26, and approximately 40 feet. Samples collected were lithologically characterized and screened in the field with a photoionization detector (PID). In addition to the samples collected in the brass sleeves, samples showing the highest PID readings were submitted for chemical analysis. The most significant PID readings were obtained from soil samples at the northeast corner of the truck bay (SWMU 3) (see Photo 1). Soils in the area appeared to be predominantly clayey silt.

XYZ Contractors was equipped with only four split-barrel samplers; therefore, the contractor decontaminated the samplers between samples during the drilling of each borehole. The samplers were scrubbed thoroughly in a tub of soapy water and rinsed in clean, distilled water (see Photo 2). All auger flights were decontaminated between borings. The auger flights were decontaminated with a high-pressure steam cleaner. EPA personnel observed no significant deviations of the decontamination procedures used by XYZ Contractors from those specified in the approved RFI work plan.

EPA observed the installation of wells at the two remaining locations (see Photo 3). Wire-line coring equipment was used to drill the boreholes. At one of the locations, fractures in the core sample from the upper portion of borehole were observed to occur infrequently, and facility personnel decided to complete the location as a single deep well. At the last location specified in the RFI work plan, a two-well cluster was completed. The single deep well was constructed with a five-foot polyvinyl chloride (PVC) well screen in the corehole. A second hole was drilled to the desired depth with an eight-inch tri-core roller bit. A 10-foot screen was used for the shallow string. The deep and shallow strings were separated by a minimum of two feet of bentonite pellets.

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Figure C-5: Corrective Action Inspection Report for Smith Trucking (continued)

EPA observed the sampling of two groundwater monitoring wells. Depth to groundwater and total depth of the well were measured at both locations with an electric water level indicator. The wells were purged with a submersible pump in accordance with approved procedures, as the XYZ personnel recorded information on field documentation sheets. Sampling equipment, such as bailers, was used and the samples were submitted for analysis in conformance with the work plan.

At the locations of soil borings, well installations, and well sampling activities, XYZ personnel monitored the breathing zone with the PID, in accordance with the work plan's health and safety plan. Near the northeast end of the truck bay (SWMU 3), concentrations of VOCs registered by the PID in the breathing zone were approximately 10 parts per million (ppm). XYZ personnel donned air-purifying respirators before continuing with drilling activities at this location (see Photo 4).

4.0 APPARENT VIOLATIONS OR DEVIATIONS FROM REQUIRED PRACTICES

During the corrective action inspection, EPA personnel observed the following possible deviations from practices required under the approved RFI work plan and consent order:

- The soil samples collected in the brass sleeves were used for analysis for VOCs. Plastic caps were placed in the ends of the brass sleeves and sealed with silicone tape (see Photo 5). This sample collection procedure is inconsistent with the sampling procedures specified in the approved RFI work plan which required the caps to be sealed with a hot wax solution.
- When the PID detected a reading of above 5 ppm VOCs in one of the soil cores, XYZ personnel packed a brass sleeve with the soil. This circumstance usually occurred after the soil core had been split open and exposed to the air. This manner of collecting samples for analysis for VOCs is contrary to that specified in the approved RFI work plan which required the facility to use practices to minimize the volatilization of contaminants. This method of collecting soil VOCs may have resulted in some loss of contaminants.

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Figure C-5: Corrective Action Inspection Report for Smith Trucking (continued)

- During drilling activities near the truck bay, EPA personnel noticed that XYZ personnel had not placed plastic under the racks where the split-barrel samplers were being opened. Pieces of the soil cores had fallen on the exposed soil beneath, a circumstance that could result in contamination of the soil at those locations (see Photo 6).

- Inconsistencies were observed in the disposal of decontamination water and soil cuttings in hazardous waste drums. Red barrels were labeled "HAZARDOUS WASTE -- Groundwater," while yellow barrels were labeled "HAZARDOUS WASTE -- Solid." EPA observed the placement of decontamination water in the yellow barrels and soil cuttings in the red barrels (see Photo 7). This practice could cause an error in the handling of these investigation-derived wastes.

- The RFI work plan called for the construction of cluster wells at seven locations. However, the facility deviated from the plan in the field because of observed conditions. As previously stated, well clusters were not installed in boreholes in which a lack of water production or a lack of fracturing was observed in the upper 50 feet of bedrock. Because of these conditions, single deep wells were installed at five of the seven locations specified in the work plan. A map showing the location of the single wells and well clusters is shown Figure 3.

- One well, MW-6, was not grouted all the way to the top (Photo 8). It appeared that approximately five feet of the hole remained to be grouted. The well had been installed seven days before the inspection. A copy of the monitoring well completion diagram showing the date of the installation is contained in Appendix E.