SECTION III

FUNDAMENTALS OF

ENVIRONMENTAL COMPLIANCE INSPECTIONS

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CHAPTER 1

INTRODUCTION TO ENVIRONMENTAL COMPLIANCE

1.1 COURSE OBJECTIVES

This section of provides a brief overview of the course *Fundamentals of Environmental Compliance Inspections* that EPA uses in training its new inspectors. It is hoped that you will 1) gain an understanding of the policies, procedures and techniques an EPA inspector is required to follow and 2) find the information provided to be useful in conducting your own environmental compliance inspections as well.

Note: All the following information represents EPA policy.

1.2 COMPLIANCE MONITORING

Purpose of Inspections

To ensure that environmental requirements are being implemented effectively, inspections are conducted to:

- Assess compliance status and document violations for enforce-

ment action.

- Provide oversight of inspection programs carried out by other agencies such as state jurisdictions.

- Gather data as part of an area/industry-wide inspection plan to assess the need for additional controls.

- Promote voluntary compliance.

- Establish an enforcement presence to promote compliance.

- Support the permit issuance process.

1.3 MOTIVATION FOR COMPLIANCE

Motivating Factors

- Societal/moral factors
- Short-run economic factors
- Long-run economic factors

Natural Disincentives

- Individual property rights
- Economic advantages of noncompliance
- Fear of change
- Expediency
- Lack of knowledge on how to comply or where to get that knowledge

Role of Enforcement

- Fear of detection
- Assurance of fairness

Credible Enforcement Presence

- Likelihood of detection
- Serious consequences of detection
- Swift and sure response
- Fair and consistent response

1.4 THE INSPECTOR'S ROLE

The inspector plays a crucial role in motivating companies to comply with environmental regulations, thereby protecting the people who might otherwise be exposed to toxic chemicals and other hazardous materials. The more effective the inspector can be, the higher the rates of compliance

will be. Higher rates of compliance mean lower risks to human health and the environment. If an inspector does not find and properly document a violation, there can be no enforcement.

Inspectors must master both the "science" and the "art" of inspections. You need not only a thorough understanding of the technical aspects of the job -- you also need to learn to ask the right questions, follow the paper trails, and check out inconsistencies.

CHAPTER 2

INSPECTION PLANNING AND PREPARATION

Planning and preparation are essential to:

- Focus the inspection on the most important issues.
- Make the most efficient and effective use of time on site.
- Ensure that equipment will be available when needed.
- Ensure that proper procedures are followed.

2.1 RESPONSIBILITIES OF THE INSPECTION TEAM

Inspector Responsibilities

Effective inspections begin with careful planning that includes:

- Reviewing available information on the facility, and
- Preparing an inspection plan.

2.2 FACTORS TO CONSIDER IN SELECTING MULTIMEDIA INSPECTION APPROACHES

The multimedia inspection approach may be implemented for:

- All inspections,

- Facilities or industries that pose the greatest risk, and/or

- Where such inspections achieve the greatest deterrence.

This choice generally depends on the type of multimedia inspection being conducted, the objective to be achieved, and the design of the inspection program. Common factors used for targeting multimedia inspections include the following:

- ***Industrial sector or processes***—Wastes from facilities in the same industrial category exhibit similar characteristics. For this reason, US environmental regulations often include standards that prescribe discharge or emissions limits for specific categories of industries (for example, organic chemical manufacturers or pulp and paper mills). Enforcement activities in support of industry-specific regulations will usually be organized by industry as well.

- ***Geographical***—Targeting multimedia inspections for geographical areas may result from mandates, including national legislation or international agreements, designed to improve environmental conditions in a severely impacted area. In some cases, multimedia inspections of all potential sources in a geographical area may be necessary to obtain data that enables development of a comprehensive remedial action plan for the area.

- ***Pollutant-specific***—A particular pollutant or group of pollutants could be the focus of a multimedia inspection with the intent of developing a pollutant reduction plan. Specific pollutants are the focus of multimedia inspection program in most of the countries participating in the study.

The United States uses several factors to determine whether multimedia inspections are appropriate in a specific instance. These factors include:

- location,
- industrial sector,
- potential for multimedia discharges,
- compliance history,

- national, regional and local initiatives,
- environmental justice, and regional concerns. Initiatives may change over time, resulting in one specified geographic area and/or industrial category targeted in one year, and another area/category targeted the next. Sequential targeting recognizes resource limitations in any single year. In addition, regulatory program interest may be factored into the decision.

2.3 TYPES OF MULTIMEDIA INSPECTIONS

The four basic multimedia inspections include:

- ***Multimedia Screening—***One or more inspectors conducting detailed compliance assessments with respect to media-specific requirements while simultaneously screening for, and reporting on, indicators of possible noncompliance in other program areas. Such screening inspections may serve as precursors to more detailed inspections, as necessary.

- ***Team Inspections—***A team of inspectors is deployed to the facility to conduct a comprehensive evaluation of the facility's overall compliance. Each inspector investigates his/her own area of media-specific program expertise.

- ***Consolidated Inspections—***Use of one or more inspectors, where each inspector may investigate one or more media programs during a single inspection. Inspectors that conduct consolidated inspections are often specialized or "process expert" inspectors.

- ***Process and Prevention Inspection-***This inspection involves examining all aspects of industrial processes, including compliance, pollution prevention opportunities, compliance assistance opportunities, and other issues related to environmental performance and improved efficiency.

The first three inspection types share a common purpose, that of conducting a compliance assessment. While they share the same purpose, they accomplish that purpose differently, considering resource and site-specific circumstances. The fourth type,the "process and prevention inspection", offers a "beyond compliance" perspective as well as a compliance evaluation. While any of the inspections can be altered to include a process and prevention inspection, a multimedia evaluation can best be conducted within the context of a team or consolidated inspection.

Exhibit 1-1 provides a brief review of the objectives, advantages, and disadvantage of these four inspection approaches. It also provides a brief description of the types of facilities that each inspection type might target.

Exhibit 1-1. Relative Advantages Among Approaches to Multimedia Inspections

Type of Inspection	Potential Objectives	Advantages	Disadvantages	Target Facilities
Multimedia Screening	Expand scope of inspection	Leverage inspection resources	Identify major violations	Simple approach, requires least amount of time	Leverages inspection resources

No extensive training required

Identifies major violations May fail to identify all violations Appropriate for smaller, less complex facilities, or in conjunction with more thorough single media inspections

Team Inspection Comprehensive coverage of compliance issues for programs addressed

Promotes deterrence Does not require additional cross-training of staff

Can achieve comprehensive coverage of facility

Promotes deterrence Significant demand on staff resources

May not address cross-program issues Appropriate for intermediate to large or complex facilities subject to multiple environmental laws

Consolidated Inspection Addresses compliance issues

Addresses cross-program issues and those that cause violations

Promotes deterrence Can address cross-program issues and those that cause violations

Results in a more comprehensive understanding of facility Require cross-training of staff

Can be most complex to execute because each inspector is assessing compliance with multiple program requirements Appropriate for small facilities with multiple processes subject to numerous environmental requirements

Appropriate for certain types of industry sectors (that is, autos, printers, dry cleaners, etcetera)

Process and Prevention Inspections

(NOTE: Generally used as part of team or consolidated inspection) Improve overall efficiency and environmental performance

Promote broader goals (for example, pollution prevention, compliance assistance) Considers all relevant factors

Capable of improving overall process

Capable of promoting broader goals (for example, pollution prevention, compliance assistance)

Appropriate for industry sectors Requires development of in-depth understanding of facility

Training essential Appropriate for any size facility where the goal is to identify and address process-related causes of noncompliance

Less appropriate where facility operates in bad faith

2.4 REVIEWING AVAILABLE INFORMATION

A review of available information will enable inspectors to:

- Become familiar with the facility (personnel, size, operations);
- Learn about findings from previous inspections, including violations;
- Avoid requesting previously submitted information; and
- Clarify legal and technical issues before entry.

Available Information

The following information might be available:

- Facility location, geographical features;
- Names of officials or representatives;
- Descriptions of recordkeeping/filing systems;
- Previous entry problems;
- Safety requirements;
- Special exemptions from requirements;
- Notifications;
- Prior inspection records;
- Compliance problems/enforcement actions;
- Complaints from citizens about the facility; and
- Correspondence.

2.5 PREPARING THE INSPECTION PLAN

An inspection plan is an organized approach to guide the conduct of the inspection. It:

- States the reason for inspection;
- Defines the scope of the inspection;
- Specifies procedures;
- Defines tasks; and

- Identifies equipment and materials needed.

Inspection Plan Elements

An inspection plan should include:

- Objectives and scope;
- Inspection activities and field techniques;
- Quality Assurance Project Plan, including a sampling plan;
- Safety plan; and
- Administrative requirements.

Use the preinspection checklist that follows this section or develop one of your own to ensure that you have completed all planning tasks for each inspection.

2.6 PREINSPECTION CHECKLIST

GENERAL EQUIPMENT

- Camera
- Film and flash equipment
- Pocket calculator
- Tape measure

GENERAL EQUIPMENT (cont.)

- Clipboard
- Waterproof pens, pencils, and markers
- Locking briefcase
- "Confidential Business Information" stamp
- Stamp pad
- Pre-addressed envelopes
- Plastic covers
- Plain envelopes
- Polyethylene bags
- Disposable towels or rags
- Flashlight and batteries
- Pocket knife
- First Aid Manual
- Kneeboard
- Knapsack
- Rope

SAMPLING EQUIPMENT

Sampling equipment will vary by program and media. Examples of typical sampling equipment follow.

- Crescent wrench, bung opener
- Siphoning equipment
- Weighted bottle sampler
- Bottom sediment sampler
- Liquid waste samplers (e.g., glass samplers)
- Auger, trowel, or core sampler
- Scoop sampler
- Sample bottles/containers (certified clean bottles with teflon-lined lids)
- Labeling tags, tape
- Storage and shipping containers with lids

SAMPLING EQUIPMENT (cont.)

- Ice chest
- Container for contaminated material
- Hazard labels for shipping samples
- Ambient air monitor
- Field document records
- Vermiculite or equivalent packing
- Thermometer
- Colorimetric gas detection tubes
- pH equipment
- Explosimeter
- Oxygen meter

SAFETY EQUIPMENT

- Safety glasses or goggles
- Face shield
- Ear plugs
- Rubber-soled, metal-toed, non-skid shoes
- Liquid-proof gloves (disposable, if possible)
- Coveralls, long-sleeved
- Long rubber apron
- Hard hat
- Plastic shoe covers, disposable
- Respirators and cartridges
- Self-contained breathing apparatus
- Drinking water - plain and salted (1 tsp. salt/5 liters H_2O)

EMERGENCY EQUIPMENT

- Substance-specific first aid information
- Emergency telephone numbers
- First-aid kit with eyewash

- Fire extinguisher
- Soap, waterless hand cleaner, and towels
- Supply of clean water for washing

CHAPTER 3

ENTRY AND OPENING CONFERENCE

3.1 KEY ELEMENTS OF ENTRY

Inspectors should:

- Follow correct administrative procedures and requirements -- failure to do so can jeopardize subsequent enforcement actions.

- Check planned inspection activities against the actual situation at the site and make adjustments as needed.

3.2 APPROACHING THE FACILITY

The investigation begins before you reach the front door of the facility. As you approach the facility, look for signs of potential violations. These can include:

- Dead or unhealthy vegetation

- Unusual emissions from stacks

- Ponds or lagoons on the property that appear to contain oily or discolored water or sludges

- Leaking containers

- Uncovered piles of waste

- Open burning or burn pits
- Oil or discoloration of water in streams or rivers that surround the property
- Strong or noxious odors
- Dust or debris on haul roads
- Deposits on vehicles

Be prepared to amend your plan to focus on these potential problems.

3.3 ENTRY PROCEDURES

Inspectors should follow proper procedures when entering a facility so that no questions or challenges can be raised regarding the legality of the inspection.

- Arrive during normal working hours.
- Use the main entrance.
- Ask to see the owner or other authorized facility representative.
- Present your credentials.
- Explain the inspection authority.

3.4 OPENING CONFERENCE

The inspector should use the opening conference to inform the facility representative of planned activities, to gain an understanding of the facility's operations and practices, and to address logistical arrangements. Inspectors should:

- Explain the anticipated inspection activities in *general terms*.

- Identify activities and processes that occur at the site and their environmental implications.

- Determine what environmental programs and controls are in place (e.g., air monitoring, employee training, equipment maintenance) and what records are available.

- Verify the applicability of regulations or requirements.

- Determine who the responsible parties are for the site.

3.5 AMENDING THE INSPECTION PLAN

Information gathered as you approach the site and during the opening conference may lead to changes in the inspection plan. Be prepared to add or change interviewees, sampling points, and record reviews.

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CHAPTER 4

INFORMATION GATHERING AND DOCUMENTATION

4.1 TYPES OF INFORMATION AND DOCUMENTATION

Types of Information

There are four types of information and documentation:

- Testimonial (what you are told)
- Real (physical samples you gather)
- Documentary (written records you collect or copy)
- Demonstrative (photographs and drawings you make)

4.2 DOCUMENTING INFORMATION

Field Logbook

An inspector's field notes/logbook:

- Provides the foundation for preparing reports.

- Is useful in refreshing memory.

- Should contain information which is objective, factual, and free of personal feelings or conclusions.

- Should be bound and consecutively numbered.

- Should list documents taken or prepared, photos taken, unusual conditions, problems, interview notes, general information, incidents, and administrative data.

Inspectors should:

- Maintain one logbook per inspection.
- Use waterproof ink.
- Write legibly.
- Draw a line through incorrect entries and initial them.
- Make a diagonal line at the conclusion of an entry and initial it.

4.3 TECHNIQUES FOR IMPROVING INFORMATION GATHERING SKILLS

Detecting hints of potential violations will help you focus your inspection on the most important issues.

In interviews, listen for:

- Reports of knowing violations, such as night dumping or shutting down of pollution control equipment.

- Reports of accidental releases, such as spills.

- Complaints about odors, skin problems, or other health effects that workers believe to be related to contact with hazardous or toxic materials in the workplace.

- Information that conflict with written records or reports from other workers.

During the inspection, look (and smell) for:

- Excess or uncontrolled emissions, excess odors

- Spills, leaky containers, and generally poor housekeeping.

- Inoperable equipment or equipment in a gross state of disrepair.
- Equipment that has been damaged from fire or explosion.

4.4 RECORDS INSPECTION

The two objectives of inspecting facility records are to:

- Determine whether required records are being maintained; and
- Use facility records as a substantiation of compliance or noncompliance.

Review Considerations

The inspector should note the kinds of records examined and why. When reviewing records, consider these questions:

- How complete is the information?
- What are alternative sources for the same information?
- Has the facility tried honestly to meet recordkeeping requirements?
- Are there discrepancies or suspicious consistencies between current reports and field data or past reports?
- Are the required reports complete, accurate, and of good quality?
- Do the records comply with retention requirements?
- Does information in the records seem consistent with first-hand observations?

Targeting and Locating Records

As part of determining exactly what records an inspector needs to examine, he or she should:

- List the kinds of records needed for compliance and their retention requirements.
- Become familiar with the facility's recordkeeping system.
- Establish priorities for the material to be reviewed.
- Request that facility personnel identify pertinent files and sources.
- Check back-up and cross-filing systems that might make retrieval more efficient.

Records Sampling Time constraints often prevent inspectors from examining all records at a facility. Therefore, the inspector reviews only a sample of these records. To increase the likelihood that problems will be detected, it is important that the sample is "representative" of the entire universe of records, just as it is important that a physical sample is representative of air emissions or water effluent.

The key point in sampling is to think systematically. If the inspector suspects a problem, the sample should be drawn from records that are likely to document the problem. The sample could focus on a particular time period, a specific set of employees, or specific activities.

Sampling methods include:

- **Random sampling** -- each record has an equal chance of being included in the sample.
- **Interval sampling** -- every fifth, tenth, etc. record is selected based on a random starting point.
- **Stratified sampling** -- breaks the entire population into categories based on relevant characteristics and applies random or interval

methods within categories. A larger sample can be drawn from categories of concern.

- **Block sampling** -- selects records only within a specific category.

4.5 PHYSICAL SAMPLING

Why Take Physical Samples Physical samples are taken during a compliance inspection to substantiate that a violation occurred. Samples provide quantitative data to assess the nature, level, and extent of pollution or contamination that result from a violation. Physical samples may include the results of in-situ monitoring, or later analysis of samples of soil, water, air, wastes, sludges, and residues from a site. Sampling may even include biological sampling to establish whether or not contaminants have damaged or have the potential to damage the environment or human health.

Developing A Plan In order to conduct sampling that supports the goals of an environmental inspection, it is important to develop a plan that will guide the selection of appropriate sampling methods. The Plan should:

- Establish and communicate sampling objectives and data quality requirements;

- Identify levels of discharge that will be within compliance;
- Make realistic projections of cost and time required for sampling;
- Establish comprehensive sampling and quality assurance protocols; and
- Identify and characterize broader site conditions to support sampling data.

What Information Can Be Used for Planning? Inspectors are responsible for monitoring compliance for all potential sources of pollutants. An examination of any available records about a site is a useful way to begin planning an inspection. Many of the sites you will inspect may already be permitted. If this is the case, the office with jurisdiction over the facility might maintain a file on the permits that contains information about the types and amounts of discharges that will be found at a site. It may also contain reports and information on previous inspections. Your job, here, will be to assess whether or not a site has come into compliance or has maintained compliance.

Many of the sites that you will inspect may not have permits or applications for permits on file. These sites may have been brought to your attention by citizen complaints, news reports, police reports, or observations collected in a visit to a nearby site. You may have little information to use in developing a plan but you will need to identify a best approach before you go into the site to conduct an effective compliance inspection.

Developing A Project Plan A quality assurance project plan (QAPP) should be developed for each sampling inspection. This plan details how the inspection will be conducted and what the objectives for the inspection are. It should include the following:

- A description of the site and project;
- Identification of the data quality objectives for the study;
- A description of the sampling to be done and justification for selection of sample sites;
- A description of quality assurance and quality control methods and requirements;
- A description of the analysis and sampling plans and standard operating procedures (SOPs);
- A description of sample preservation and chain of custody require-

ments;

- A description of documentation required to meet the administrative and technical requirements;

- A project safety plan; and

- Other relevant information.

The description of the site should include any available maps that will be useful in identifying sampling locations and points of reference. Even for unpermitted and undocumented sites, it may be useful to include the best available map so that probable points of discharge, wells, and other surface features can be used to identify probable sampling points. Samples and/or appropriate on-site monitoring instrument analysis should be taken from every observable aqueous discharge. Samples may also be taken from process reactors when necessary to identify or confirm the chemical processes occurring at a facility. Samples from pools of water near waste drums and containers may reveal leakage from these containers.

Because many of the facilities that you will visit are not yet permitted, you will often need to make decisions in the field on what should be sampled. Let your eyes, nose, and ears be your guide! The presence of unusual solids, scums, and corrosion near a discharge outlet, pipes, or valves may be a good indicator that a toxic or hazardous material has escaped into the environment. You may want to carefully collect samples of these residues for analysis. Samples from nearby wells may also reveal the presence of contaminants in groundwater.

For air quality, you may want to monitor, or collect samples from stacks, but you may also want to use monitoring equipment to check around tank seams, pipes, valves, and tank openings to look for fugitive emissions.

You may also want to take samples of soil surrounding process tanks or piping if there is any indication of spillage. Similarly, soil samples from storage depots where drums or containers of suspected wastes are kept may confirm the nature and extent of any spills. Soil samples can be taken from the surface or from deeper in the ground using coring or drilling devices.

Data quality objectives (DQOs) should be identified as part of the QAPP, prior to the actual inspection. DQOs are specifications for what is required to establish a statistically sound characterization of conditions at the site. DQOs will identify where and how many samples will be taken to

establish a representative picture of site conditions. The DQO statements will also establish the statistical requirements for detectibility, precision and accuracy in analysis or on-site monitoring and identify what will be required to achieve completeness in sampling. These short definitions may help you understand these concepts associated with chemical analysis:

- Detectibility -- the lowest concentration of a substance that can be measured as being present

- Accuracy -- the degree of agreement of a measured value and a true value for a substance

- Precision -- the degree of agreement between repeated measurements of the same sample

How Do DQOs Help? It has been said that "the ability to correctly determine the difference between a bull and a mouse at least 95% of the time" is a data quality objective for selecting the right mouse trap. While this is a very simplified picture of what DQOs do, it does illustrate how important it is to identify what you will need to do the job correctly. A better example of how to select DQO's might be found in selecting methods of chemical analysis that will be sensitive enough to determine if the concentrations of a contaminant in a sample are in violation or not.

When and how often you sample may also be very important and the QAPP should identify the timing and frequency of samples. An example of this is often seen when you are required to monitor discharges that are part of specific industrial process that occur only at specific times. Unless you have a system that monitors continuously over a period of time, you may miss the discharge violation.

QA/QC There are a number of steps an inspector should take to provide information about the quality of sampling and analysis. The laboratory should provide you with information from analysis that will allow you to assess whether or not the analytical quality objectives were met, but you must also be prepared to assess the quality of on-site monitoring and sample collection. The QAPP should also include protocols and special samples (Quality Assurance or QA Samples) that will help you assess data quality. These steps should include:

- Exact protocols on daily calibration of field monitoring equipment such as pH meters, flow meters, UV gas detectors, and conductivity meters. Manufacturers' manuals should be provided to ensure correct calibration.

- Protocols for quality control checks during operation of field and laboratory instruments. Frequent use of independent quality control check standard materials

(QCCS) (independent of calibration standards) will be necessary.

- Protocols for collection of QA samples including field duplicate samples to measure field variability; and field blank samples - samples that are laboratory pure water (deionized and distilled) but handled just as any other sample - are used to check for cross-contamination between samples.

- Protocols for cleaning of equipment and safe decontamination of field equipment to avoid cross- contamination of samples or health risks to inspectors and technicians.

- Protocols for laboratory QC sample analysis for assessment of accuracy, precision, and detectibility.

- Protocols to identify the number and types of sample containers to be used and the volumes of samples and preservatives required.

Plan The Logistics Arrangements for travel and secure shipment of samples should be made ahead of time. Make sure that the materials you will require are collected, packed and shipped (when necessary) to a place where they will be secure until you arrive. Checklists are often used to verify that you will take everything you need. Use a field log book with numbered sequential pages for maintaining observations taken during your inspection. Make all entries directly in this book. Do not transcribe them from other papers but take this book into the field with you. Do not obliterate entries but place a single line through incorrect entries, make corrections and initial corrections in the margin of the page.

If you are taking any monitoring instruments to the inspection site, such as pH meters, flow meters, gas detectors, etc. check them out before you pack them to make sure they work and can be calibrated for use. Carry fresh spare batteries for instruments that are battery-powered as well as some alcohol and an abrasive cloth to keep battery terminals clean.

Carry an ample supply of clean laboratory water for use as field blanks or to make buffers and other reagents in the field. If possible, make up standards for calibration fresh for each inspection and refrigerate them while you are in transit.

It will be important to coordinate your activities with the laboratory that will analyze the samples. Check requirements for sample volumes and preservation methods with the laboratory and give them advance warning about when and how many samples will arrive at the laboratory. Make sure someone will be there to receive them so that the samples will be maintained in a chain of custody.

Identifying Sampling Points Inspectors should rely on the QAPP and the Sampling Plan in that document to identify sites where samples are to be taken. In permitted sites, you may find conditions that are not in agreement with what is stated in the QAPP and you will have to use your discretion about drawing additional samples based upon your interview and what your eyes, ears, and nose tell you. Monitoring instruments that you carry may extend the sensitivity of those senses but your most important tool will be your judgment. Remember that deviations from your Sampling Plan and QAPP will need to be documented in your field notes and that you will need to amend your QAPP when you return to your office to provide justification for the change in the inspection and guidance to the next inspector who visits that site.

Many inspectors find it useful to photograph each sample location at the time the sample is taken or monitoring is performed to capture a visual image of conditions. If you can photograph the sampling, remember to write the frame number in your field notes.

Using Monitoring Equipment If you are using monitoring instruments, you will need to check their operation and calibrate them at the beginning of each day. Follow the manufacturer's instructions regarding recalibration and use of quality control check standards.

Record all instrument readings in your log book along with date, time, and specific sample site location (for example - "air vent near process tank on northwest corner/second floor of building #2- see indicator on map"). Also indicate in your field notes if other samples were also collected at the site.

Collecting Samples Samples or monitoring readings (when appropriate) should be collected at all observed discharges for water and air effluents when discharges are occurring. Locations that show discoloration, scums, slimes, deposits, corrosion, and other indications of chemically contaminated discharges should have the highest priority. Similarly, air monitoring may be appropriate where discharges are apparent, or where odors, visible vapors, air flow noises, or abrupt heat differences indicate stack or fugitive emissions. Permanent collection devices, such as bag or precipitator air cleaning devices may be sampled as can process reactors if it is desirable to characterize and quantify ingredient/process/waste/ product streams for the application of mass-balance approaches to determining wastes.

Water samples may be collected directly from flows by grab sample, or by pump or collection bottle, taking precautions to rinse collection devices and go from areas of lowest contamination levels to high if possible to minimize sample cross-contamination.

Air samples are most often obtained using monitoring instrumentation, or by the use of a pump and adsorbent system to capture contaminants from an air stream (see Figure 4-1).

Figure 4-1. Sampling from a high-negative-pressure duct

Solids such as soil can be scoop sampled, or drilled, or cored. Liquid wastes such as solvents or chemicals in barrels are best sampled using a dipper that is usually called a “thief”.

AT ALL TIMES DURING SAMPLING, INSPECTORS SHOULD KEEP THEIR SAFETY FOREMOST IN THEIR MIND. INSPECTORS SHOULD NOT RISK THEIR LIVES OR HEALTH TO COLLECT SAMPLES.

Sample volumes vary with the media to be analyzed and the contaminants of interest. Laboratories can advise you concerning the types of containers that should be used for specific sampling and the volume or weight of sample to be collected. Reference guides such as the Water Pollution Control Federation (WPCF) *Handbook for Chemical Analysis of Freshwater* can also give you guidance.

QA Samples Quality Assurance Samples from the field will account for about 10% of the total number of samples sent to the laboratory. They include field blank samples to identify background levels of contamination encountered in sampling; field duplicates to identify site variability; and split samples (where a sample is divided in half and put into two separate containers in the field) for estimating variability introduced by sampling itself.

Preservation Most samples will need to be preserved to stabilize the contaminants in the sample against thermal, chemical, or biological decomposition. Some samples can be

preserved chemically but many will need to be refrigerated at 4 degrees Celsius for shipment to the laboratory to retard decomposition. It is very important to ship samples well chilled in the fastest possible way. The temperature of the samples upon arrival at the laboratory will also need to be recorded.

Labels Samples taken in the field need to be labeled completely and correctly prior to shipping. Every sample label should contain:

- a unique sample number;
- site name;
- date;
- time;
- analysis;
- preservative used; and
- inspector's name.

The sample control number should be recorded in the field log book along with a description of the sample that includes sample location and type as well as the dates of sampling and shipping and conditions of shipping. Later, you will confirm the sample's condition at the time of arrival at the laboratory and make that part of your log entry.

Sealing Samples should be sealed with a protective band of tape that prevents seepage that could contaminate the sample. Sealing the sample in a plastic bag, or even two plastic bags, will help prevent contamination of other samples. Ice that is used to cool the samples in the cooler for shipping should also be bagged in plastic to minimize the risk of melt-water contaminating the samples. At the laboratory, the bags and seals should be inspected by the technicians to confirm that no breakage, leakage, or tampering has occurred.

Chain of Custody Once the shipping container containing the samples is full, and the shipping temperature of the samples can be confirmed at 4 degrees C., the cooler should be closed, sealed with packing tape, and then sealed with a custody seal. Transfer of the cooler from inspector, to shipping agent, to laboratory clerk should be documented with signatures and dates on a chain-of-custody receipt that travels with the samples. Upon arrival at the laboratory, the laboratory technician or clerk who receives the samples should examine the seal for tampering and certify it's integrity before opening the shipping cooler. The technician should confirm the 4 degree C temperature in the cooler upon opening, and store the samples in a secure, cold location, where access is regulated and documented. In this way sample integrity can be assured and documented to refute any claim of tampering or mishandling that could compromise the data. In general, samples should arrive at the laboratory within a day or two of collection to ensure adequate refrigeration, and samples should be packed with an equivalent weight of ice (5 liters of samples needs 5 kilograms of ice) to ensure

adequate preservation in transit.

Confirm Condition of Samples on Arrival It is the inspector's responsibility to confirm that the samples arrived safely and that all samples were intact and that refrigeration was adequate. To complete his records, the inspector should request the chain of custody receipt form and seals be returned to him for inclusion in the inspection file.

Evaluating the Data Both quality control and quality assurance data need to be evaluated before you can use the sample data with confidence. Here are some things to look for.

Laboratory and Field Quality Control Data

- Confirm that all laboratory analyses support the "accuracy" data quality objective for each analysis parameter.

- Confirm that the laboratory has tested accuracy of analysis using either analysis of an independent audit material, recovery of a "spike" of the analyte of concern added to a sample after original analysis, or in the case of analysis for unknown organic materials, that a surrogate organic compound of similar molecular weight and structure can be quantified accurately.

- Confirm that the laboratory has analyzed duplicates or splits of samples and that the results are repeatable within the data quality objective for precision.

- Confirm that the laboratory has satisfactorily demonstrated the detection limit for the analytes of interest on a regular basis.

Quality Assurance

- Examine the results of field blank analysis and confirm that field blanks do not contain contaminant of interest in concentrations greater than 3 times higher than the instrument detection limit.

- Examine the results of field duplicate analysis to characterize field variability of the contaminant.

- Examine the results of field split analysis -- variability should not exceed the specified data quality objective for precision.

- Examine sample results data for outlier values -- data which lie far below or far above the mean and standard deviation for the rest of the field sample (don't include the blank) results. These data may be suspect. Applying a statistical test for outlier value (such as Grubbs outlier test) can assist you with this evaluation.

Maintaining Records Original copies of laboratory reports, chain of custody documents, calculation worksheets, and your field notebook should be maintained as part of the inspection file. These records should be secured to avoid loss or tampering.

4.6 INTERVIEWS

Planning the Interview

As the first step in the interviewing process, planning the interview should involve:

- Identifying the interviewees who could provide information to meet inspection objectives;

- Identifying the specific reason that a particular person is to be interviewed and information to be obtained; and

- Scheduling the interview at a convenient time and place for the interviewee, if possible.

Conducting and Documenting the Interview

The initial contact between inspector and interviewee sets the tone. The main points of the interview include:

- Asking the employee to explain his or her responsibilities as they relate to the topics being reviewed in the inspection;

- Asking specific and concrete questions to help answer the compliance questions raised in the inspection plan;

- Rechecking after each phase of the interview to see that all the "unknowns" have been explored;

- Rearranging the information mentally into a logical order; and

- Summarizing the interview to allow the interviewee to correct any mistakes.

An inspector should always document an interview, either by taking detailed notes, getting signed statements, or tape recording the interview.

Questioning Techniques

The basic questions used in interviewing are:

- What happened?
- When did it happen?
- Where did it happen?
- Why did it happen?
- How did it happen?
- Who was involved?

Suggestions for improving interviews are:

- Ask questions that require narrative responses rather than "yes" or "no" answers. Yes/No questions should be used only when summarizing or verifying information that has already been given.

- Avoid leading or suggestive questions which might bias the interviewee's answers and detract from their objectivity.

- Avoid questions that ask for two separate pieces of information.

- Order the questions from general to specific topics: determine what was done before exploring how it was done. Start with the known areas of information and work toward the undisclosed information.

- Work backwards in time, from the most recent events.

- To help interviewees estimate quantities more accurately, use well-known reference points, relate to commonly observed quantities, or compare to similar items or distances at the interview site.

- Give the interviewee time to think about the response.

Collecting Written Statements

When taking written statements, an inspector should:

- Determine the need for a statement.

- Ascertain all the facts and record those which are relevant regardless of the source.

- Prepare a statement by:

  - Using a simple narrative style,
  - Narrating the facts in the words of the person making the statement, and
  - Presenting the facts in chronological order.

- Identify the person positively (name, address, position).

- Show why the person is qualified to make the statement.

- Present the pertinent facts.

- Have the person read the statements and make any necessary corrections before signing (all mistakes that are corrected must be initialed by the person

making the statements).

- Ask the person making the statement to write a brief concluding paragraph indicating that he or she read and understood the statement.

- Have the person making the statement sign it. If the person refuses, then ask for a statement in the person's own handwriting stating that the statement is true, but that he or she refused to sign it.

- Give a copy of the statement to the signer if requested.

4.7 OBSERVATIONS AND ILLUSTRATIONS

Make use of all sense perceptions: sight, smell, hearing, or touch. Make use of sketches, field notes, and photography.

Photographs as Evidence

Photographs are becoming increasingly important in the enforcement of environmental law because they are persuasive in court proceedings and provide excellent documentation.

For these reasons it is very important that inspectors become good photographers. Before visiting a facility inspectors should learn:

- Which film type is best for the expected conditions;

- How to load and unload the film;

- How to insert batteries for the flash unit (if separate) and camera;

- The minimum focal distance of the camera;

- How to operate the flash unit;

- The maximum flash distance; and

- Whether the camera has a sliding lens cover.

Although the right to photograph is part of the right to inspect, inspectors must testify that photographs fairly and accurately represent site conditions.

Tips on Taking

- Maintain fresh film and batteries.

Photos

- Use a waterproof camera if possible.
- Pay special attention to composition, including the center of interest, background, and scale.
- Use a camera which automatically records the date and time on the film.
- Document photos by noting in logbook the frame number along with a detailed description of the subject matter.
- Take a picture of your business card as the first photograph on the film.
- Record necessary information on the back of the photo when working with an instant camera.
- Place a common item next to the item of interest to indicate size and scale.
- Photograph all sides of an item if necessary to document a violation.
- Take several photographs using different settings if the light is poor.
- Take overlapping photographs to depict a wide area.

Drawings and Illustrations Maps showing location of facility and plot plans showing activities within facility are useful. Use sketches to supplement photos of equipment. Identify photo sites, sample sites, and observation sites on a sketch map or on the original site map in your logbook.

4.8 EXIT INTERVIEW

When the inspection is complete, the inspector should conduct a quick, concise, wrap-up interview to obtain any additional information necessary and to convey to the facility representative the findings of the inspection.

However, inspectors should carefully avoid conveying conclusive compliance determinations because:

- The inspector has not had time to reflect upon and correlate all observations;
- Laboratory analyses have not been completed;
- Other individuals may ultimately determine the facility's compliance status; and
- The inspection findings may represent only a portion of an enforcement case.

If asked if any violations were found, the inspector may point out various items the facility officials might want to recheck for compliance purposes. Inspectors should never say "there are no violations" at the facility.

Inspectors also should not leave a copy of field notes or checklists with the facility representative because:

- The inspector's notes or shorthand may be misunderstood; and
- The inspector may remember and write down something after leaving the site (may result in discrepancies).

4.9 EXIT OBSERVATIONS/ACTIVITIES

Upon leaving the facility, the inspector should resurvey the site and note whether any significant changes have occurred since the inspection began. Such observations may better represent typical operating conditions than what was recorded while the inspector was on site.

The inspector should also review and complete site drawings and chain-of-custody forms following the inspection.

CHAPTER 5

POST-INSPECTION ACTIVITIES

5.1 THE INSPECTION REPORT

The purpose of the inspection report is to present a complete, accurate, and factual record of an inspection. It organizes all evidence gathered in an inspection.

Elements of an Inspection Report Although the format and exact contents of an inspection report will vary, each one should provide enough information to tell the reader:

- The specific reason for the inspection;
- Who participated in the inspection;
- That all required notices, receipts, and other legal requirements were met;
- What actions were taken during the inspection, including the chronology of these actions;
- What statements, records, physical samples, and other evidence were gathered during the inspection;
- What observations were made during the inspection; and
- The results of the sample analyses related to the inspection.

Also, most reports will contain inspection report forms, narrative reports, and documentary support.

Writing an Effective Inspection Report When writing an inspection report, it is important to relate the facts and evidence relating to the inspection simply and with the reader in mind. A good inspection report exhibits:

- Fairness;
- Accuracy;
- Conciseness;
- Clarity;
- Completeness;
- The source of evidence;
- Exhibits (supplementary material);
- Organization; and
- Good writing.

Narrative Report Narrative reports, as part of an overall inspection report, should be a concise, factual summary of observation and activities. Basic steps involved in writing the

narrative report include:

- Receiving the information;
- Organizing the material;
- Referencing accompanying material; and
- Writing the narrative report. Be sure to:

    - use a simple writing style;
    - keep paragraphs brief and to the point;
    - avoid repetition; and
    - proofread the narrative.

Despite the variations in the specific information contained in a narrative report, most reports can follow an outline, which features the:

- Introduction

    - general information
    - summary of findings
    - history of the facility;

- Inspection activities

    - entry/opening conference
    - records
    - evidence collection
    - physical samples
    - closing conference; and

- Attachments

    - list of attachments
    - documents
    - analytical results.

Include photos, maps, and illustrations if they are available.

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