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BY THE U.S. GENERAL ACCOUNTING OFFICE
Briefing Report To The Chairman, Subcommittee
On Oversight And Investigations
Committee On Energy And Commerce
House Of Representatives

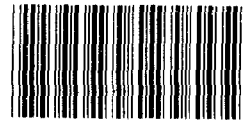
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**Air Pollution:
Environmental Protection Agency's
Inspections Of Stationary Sources**

The effectiveness and credibility of the Environmental Protection Agency's (EPA's) stationary source inspection program rests primarily on its efforts to provide state and local organizations the best possible guidance and, in turn, on such organizations' commitment to follow this guidance. EPA has issued guidance to state/local agencies on how frequently inspections should be performed and what the minimum level of inspection should be.

GAO's review of EPA's stationary source inspection program showed that during a specific time frame (primarily fiscal year 1984), about 95 percent of the stationary sources requiring inspections were inspected. On the basis of a contractor's analysis (who had also performed inspection analysis for EPA), GAO projected that at least 39 percent of the sources requiring inspections during this time frame were inspected inadequately. An inspection was considered inadequate if, in the contractor's judgment, the inspection did not meet its criteria for frequency and/or depth (degree of detail or comprehensiveness). EPA is evaluating the contractor's methodology for determining the appropriate frequency and depth of inspections.



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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

B-220319

The Honorable John D. Dingell
Chairman, Subcommittee on Oversight
and Investigations
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

As you requested we have reviewed the Environmental Protection Agency's (EPA's) inspection program for stationary sources¹ of air pollution. The Clean Air Act authorizes EPA to inspect stationary sources of air pollution to determine whether they comply with the act's emissions requirements. As of September 1984 EPA listed 29,886 operating stationary sources that emit or have the potential to emit regulated pollutants in sufficient quantity to warrant inspection. The act also authorizes EPA to delegate to state and local air pollution control agencies the responsibility for inspecting these sources. EPA has made such a delegation for all but about 620 sources.

As agreed with your office, we focused our review on determining (1) whether stationary sources identified by EPA as requiring inspections were being inspected and (2) whether these inspections provide adequate assurance that Clean Air Act emissions requirements for air pollutants are being met. On July 22, 1985, we briefed your office on the information we had obtained in response to your concerns. Subsequently, we agreed to prepare the report formalizing the slides used at the briefing, accompanied by a detailed narrative for each slide (see app. I.)

Our review showed that during a specific time frame (primarily fiscal year 1984²), about 95 percent of the stationary sources requiring inspections were inspected. To get an

¹The Clean Air Act defines stationary source as any building, structure, facility, or installation that emits or may emit any air pollutant.

²Most inspections were done in fiscal year 1984. However, because some stationary sources require only a biennial inspection, inspection information on some of these is from fiscal year 1983.

indication of inspection adequacy, we hired a private contractor--PEI Associates, Inc.,³--to analyze information, provided through a questionnaire from selected sources, in order to determine the appropriate frequency and level of inspection for each source. On the basis of our contractor's analysis, we estimated that at least 39 percent of the sources requiring inspections during this time frame were inspected inadequately. An inspection was considered inadequate if, in the contractor's judgment, the inspection did not meet its criteria for frequency and/or depth (degree of detail or comprehensiveness). EPA is evaluating the contractor's methodology for determining the appropriate frequency and depth of inspections.

SCOPE AND METHODOLOGY

We performed our review between August 1984 and June 1985. We gathered information primarily through two questionnaires. One questionnaire went to all agencies identified as having an inspection program--50 states, 5 territories, and 152 local air pollution control agencies. This questionnaire requested program information such as whether agencies were performing their delegated inspections, the reasons for not performing all delegated inspections, the number and academic background of inspectors, and the adequacy of technical training provided inspectors.

A second questionnaire pertaining to 835 specific sources went to those state/local agencies above that were responsible for the inspection of these sources. These sources were selected by taking a statistically valid sample from the universe of 29,886 sources. Information received from the 555 completed questionnaires included the source's type of pollution control equipment, compliance history, and number and type of inspections made at each in the specified time frame.

We hired a private contractor--PEI Associates, Inc.--to determine if these sources were receiving the number and type of inspections necessary to determine compliance. Under a contract with EPA, PEI had previously defined various levels of inspections and a methodology for determining both the inspection frequency and depth for particular stationary sources. The levels, in brief, were defined as (1) a visible emissions check, (2) a records check plus a visible emissions check, (3) a detailed engineering analysis, and (4) an analysis of emissions extracted directly from the stack (stack test). For our review, PEI

³PEI Associates, Inc., established in 1970, provides environmental engineering, monitoring, and inspection training to environmental and industrial clients in many fields including air pollution. In fiscal year 1984 PEI had approximately a \$1.1-million contract with EPA to provide various services.

analyzed a statistically valid sample⁴ of 385 source-specific questionnaires from the 555 completed questionnaires to determine the appropriate frequency and level of inspection for each of the 385 sources. To make these determinations, PEI used a methodology similar to one it had developed for EPA, which considered such factors as the types of pollutants emitted, the air pollution control equipment used, malfunction/breakdown history, and compliance history.

Because PEI provides inspection training services to EPA, state/local agencies, and industry, we used it to get an indication of what it believed was an adequate inspection. In addition, PEI was well suited to assist us because of its past work for EPA in developing a methodology to determine inspection adequacy and because, to the best of our knowledge, PEI was the only organization at the time of our review that had developed and used a methodology for determining inspection depth and frequency. In addition, EPA is funding another project to determine whether PEI's inspection methodology is appropriate.

We also contacted officials at each of the 10 EPA regional offices to determine (1) how many of the delegated sources not inspected by state/local agencies had been inspected by EPA and (2) the extent to which EPA was inspecting nondelegated sources.

EPA DEVELOPED GUIDANCE ON FREQUENCY AND DEPTH OF INSPECTIONS

The Clean Air Act and EPA's implementing regulations do not address a required frequency or depth of inspections. EPA, however, has developed general guidance for state and local agencies to follow. Prior to 1980 EPA's guidance recommended that all stationary sources be inspected at least once annually. In March 1980 EPA amended its guidance to suggest that state/local agencies inspect different categories of sources at different intervals on the basis of the type of source and the amount of any particular pollutant (e.g., asbestos or sulfur dioxide) emitted. However, state/local agencies may conduct more frequent inspections of a source if they deem it warranted. In March 1985 EPA provided states with guidance on depth of inspections. This guidance defined "a minimally acceptable inspection" as a visible emissions check combined with a review of plant records, readings of source-maintained control equipment, and observations of process operating equipment.⁵ EPA and state/local organizations will use this definition in performing fiscal year 1986 inspections.

⁴This sample allowed us, on the basis of PEI's analysis, to make estimates of the percentages of inadequate inspections discussed in this letter--43 and 39--with sampling errors of 7.2 percent and 5.0 percent, respectively.

⁵This is the second level of inspection defined by PEI.

FREQUENCY AND DEPTH OF INSPECTIONS

Because of its expertise in developing a methodology to determine appropriate frequency and depth of inspections, we asked PEI to apply its methodology to assist us in evaluating the adequacy of state/local inspections done in fiscal year 1984 at 385 stationary sources.

Estimates on the basis of PEI's analysis showed that about 43 percent of the sources requiring an inspection had been inspected inadequately. An inspection was considered inadequate if it should have been made and was not or, if made, not in the frequency and/or depth necessary, in PEI's judgment, to ensure that a source was in compliance with the emissions requirements. Following EPA's March 1985 guidance, which is less stringent than PEI's methodology, our estimate of PEI's analysis indicated that about 39 percent of the sources would have had inadequate inspections.

We identified several possible reasons for the inadequate inspections. These included shortcomings in EPA's guidance to states for doing inspections and limited staffing resources.

PEI's analysis of our questionnaires was similar with that which it had previously performed for EPA in April 1983. PEI's 1983 report stated that after identifying 84 sources, in an 18-county region of Virginia, that required a more in-depth inspection, detailed engineering analyses that state inspectors performed at 36 of these sources showed 12 in violation. These 12 would not have been found using a visible emissions check or records review.

PEI considered an engineering analysis inspection necessary for those sources that have control equipment and/or a previous history of violations or malfunctions. Many of the parameters measured and recorded during an engineering analysis relate directly to the operation of control equipment. These parameters (e.g., power levels, gas temperature, pressure drop, and water flow rate) are used to calculate additional parameters to evaluate the source's operation and to identify any operation and maintenance problems that may prevent continued compliance with emission standards.

EPA was not convinced that an engineering analysis is necessary to determine compliance, and thus, called for only records review inspections in its March 1985 guidance. However, EPA is continuing to evaluate PEI's methodology for determining the appropriate frequency and depth of inspections as it considers improvements to its guidance for carrying out inspections. In October 1984 EPA awarded another contract to PEI to develop a plan to identify which frequency and PEI-defined inspection (including engineering analyses) is appropriate for sources throughout Virginia. In addition, EPA and another environmental contractor are planning a pilot project in Colorado and Michigan. The pilot

will allow states to prioritize the frequency and depth of inspections for sources with a high potential for violating emission standards. The Director of EPA's Stationary Source Compliance Division stated that about a year's preliminary data gathering and planning are still necessary and that the pilot project will not be implemented until fiscal year 1987.

EPA REGIONAL OFFICES DID NOT
DO ALL THEIR INSPECTIONS

EPA guidance stated that EPA regional offices were responsible to inspect those sources the state and local agencies agreed to inspect but did not, as well as those sources not delegated to the state or local agencies. According to officials from the 10 EPA regional offices, during the time frame covered by our review (primarily fiscal year 1984), EPA regions were responsible for inspecting 1,397 sources delegated to state and local agencies but not inspected by them and 620 sources not delegated by EPA. EPA did not inspect 1,140 (82 percent) of the delegated sources and 338 (55 percent) of the nondelegated sources.

All the regional offices cited lack of staff as a reason for not doing all inspections. EPA officials recognize that more frequent and in-depth inspections will require a larger commitment of resources, and EPA is evaluating a system to prioritize the frequency and depth of inspections for sources with a high potential for violating emission standards.

CONCLUSION

The effectiveness and credibility of EPA's stationary source inspection program rests primarily on its efforts to provide state and local organizations the best possible guidance and, in turn, on such organizations' commitment to follow this guidance. EPA guidance to state/local agencies on how to conduct inspections has been evolving. EPA continues to build on its partnership with state/local air pollution control agencies through its planned pilot project with two states that will test the feasibility of allowing state and local inspection organizations more flexibility in determining the appropriate frequency and depth of inspections.

During the time frame of our review, primarily fiscal year 1984, 28,408 of the 29,886 stationary sources (95 percent) requiring inspections were inspected by EPA and state/local agencies. However, during the same period, EPA inspected only 539 of the 2,017 sources (27 percent) it should have, citing several reasons including lack of staff.

Based on PEI's analysis of our questionnaire data, we estimated that about 43 percent of fiscal year 1984 inspections were inadequate. This is based on a methodology developed by PEI that would require more frequent and in-depth inspections than required by EPA. However, even if EPA's latest guidance was

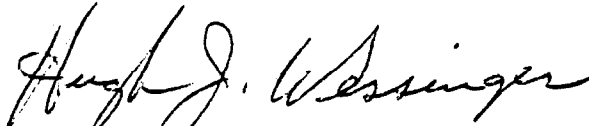
followed, we estimated that about 39 percent of the inspections were inadequate.

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We discussed the stationary source inspection program with EPA program officials and have included their comments where appropriate. However, in accordance with your request, we did not obtain these officials' views on our conclusions, nor did we request official agency comments on a draft of this report. Except as noted above, our work was performed in accordance with generally accepted government auditing standards.

Unless you publicly release its contents earlier, we will make the report available to other interested parties 30 days after the issue date. At that time copies of the report will be sent to appropriate congressional committees; the Administrator, Environmental Protection Agency; and the Director, Office of Management and Budget. If you have any questions, I can be contacted at (202) 275-5489.

Sincerely yours,



Hugh J. Wessinger
Senior Associate Director

C o n t e n t s

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ABBREVIATIONS

CDS	Compliance Data System
EPA	Environmental Protection Agency
GAO	General Accounting Office
NESHAP	National Emission Standards for Hazardous Air Pollutants

U.S. General Accounting Office

BRIEFING DOCUMENT ON
THE ENVIRONMENTAL PROTECTION AGENCY'S
INSPECTIONS OF STATIONARY SOURCES OF
AIR POLLUTION

For the

Subcommittee on Oversight and Investigations
Committee on Energy and Commerce
House of Representatives

Slide I.1

EPA STATIONARY SOURCE COMPLIANCE INSPECTION PROGRAM

- **29,886 SOURCES AS OF SEPTEMBER 1984**
- **EPA STRATEGY RELIES ON DELEGATING INSPECTION RESPONSIBILITY TO STATE AND LOCAL AGENCIES**
- **EPA PROVIDES STATES WITH GUIDANCE, TECHNICAL ASSISTANCE, AND GRANTS TO ASSIST IN CARRYING OUT INSPECTIONS**
- **EPA/STATE WORKING AGREEMENTS SPECIFY HOW STATES WILL CARRY OUT THEIR INSPECTION PROGRAMS**

EPA STATIONARY SOURCE
COMPLIANCE INSPECTION PROGRAM

As of September 1984 EPA had records on 29,886 operating stationary sources that EPA required to be inspected. A stationary source is any building, structure, facility, or installation that emits or may emit air pollutants.

EPA has delegated inspection responsibility for most of these stationary sources to state and local agencies. EPA regional office air pollution control officials told us that inspections of about 620 sources have not been delegated because the state/local agencies had not applied for delegation of these sources.

EPA provides state and local agencies with inspection guidance (see p. 19), technical assistance such as training, and financial grants for use in operating their air pollution control programs including inspections of stationary sources. These grants are authorized under Section 105 of the Clean Air Act. To obtain financial assistance state/local agencies must reach agreement with EPA annually concerning how they will carry out their compliance activities, including how often they will inspect their stationary sources.

Slide I.2**POLLUTANTS CONTROLLED**

- **CRITERIA POLLUTANTS**
 - **INCLUDE SULFUR DIOXIDE, NITROGEN OXIDES, PARTICULATES, CARBON MONOXIDE, LEAD, AND VOLATILE ORGANIC COMPOUNDS**
 - **REGULATED UNDER NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) AND NEW SOURCE PERFORMANCE STANDARDS (NSPS)**
 - **MAJOR STATIONARY SOURCES EMITTING CRITERIA POLLUTANTS ARE CLASSIFIED BY EPA AS EITHER A₁ OR A₂**
 - **A₁ SOURCE HAS ACTUAL OR POTENTIAL CONTROLLED EMISSIONS EQUAL TO OR EXCEEDING 100 TONS/YEAR**
 - **A₂ SOURCE HAS POTENTIAL UNCONTROLLED EMISSIONS EQUAL TO OR EXCEEDING 100 TONS/YEAR , BUT ACTUAL CONTROLLED EMISSIONS LESS THAN 100 TONS/YEAR**
- **HAZARDOUS AIR POLLUTANTS**
 - **INCLUDE MERCURY, BERYLLIUM, ASBESTOS, ARSENIC, VINYL CHLORIDE, BENZENE, AND RADIONUCLIDES**
 - **REGULATED UNDER NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS)**

POLLUTANTS CONTROLLED

The Clean Air Act gives EPA the authority to inspect stationary sources that emit or have the potential to emit any of the federally regulated air pollutants. These pollutants are divided into two categories--criteria and hazardous.

Criteria pollutants are regulated by EPA to meet standards based on criteria that protect public health and welfare. When we initiated our review in September 1984, the criteria pollutants were sulfur dioxide, nitrogen oxides, particulates, carbon monoxide, lead, and volatile organic compounds. Criteria pollutants are regulated by the National Ambient Air Quality Standards (section 109 of the act) and New Source Performance Standards (section 111 of the act).

As of September 1984 EPA maintained records on 28,803 sources that emitted or had the potential to emit any criteria pollutant in sufficient quantity to be considered an A₁ or A₂. An A₁ source is defined as any "major" stationary source whose actual emissions or potential controlled emissions when operating at design capacity are equal to or exceed 100 tons per year of any regulated criteria pollutant. Design capacity is defined as uninterrupted continuous operation 24 hours per day, 365 days per year, except for projected down time. An A₂ source is defined as any stationary source whose uncontrolled emissions, while operating at design capacity, are equal to or exceed 100 tons per year for any regulated criteria pollutant, but whose actual or potential controlled emissions (whichever is greater) are less than 100 tons per year.

Hazardous air pollutants are anticipated to result in an increase in mortality or serious illness. At the time of our review the hazardous air pollutants were mercury, beryllium, asbestos, arsenic, vinyl chloride, and benzene. Hazardous air pollutants are regulated by the National Emission Standards for Hazardous Air Pollutants (NESHAP) (section 112 of the act). As of September 1984, the time of our review, EPA maintained records on 1,083 emitters of these hazardous air pollutants.

In February 1985 EPA added regulations covering radionuclides as a hazardous air pollutant. In June 1984 EPA proposed regulations for benzene emissions from coke by-product recovery plants. As of August 1985 EPA was developing the final regulations for such emissions.

Slide I.3**GAO ASKED TO EXAMINE EPA'S
INSPECTION PROGRAM FOR
STATIONARY SOURCES**

- **FOCUS ON INSPECTION FREQUENCY AND DEPTH**
- **PROGRAM INFORMATION REQUESTED FROM 55 STATES AND TERRITORIES, 152 LOCAL AIR POLLUTION CONTROL AGENCIES, AND ALL 10 EPA REGIONAL OFFICES**
- **INFORMATION REQUESTED ON 835 SPECIFIC SOURCES**
- **CONSULTANT USED TO EVALUATE ADEQUACY OF FREQUENCY AND DEPTH OF INSPECTIONS, GIVEN SPECIFIC SOURCES**

GAO ASKED TO EXAMINE EPA'S INSPECTION
PROGRAM FOR STATIONARY SOURCES

On the basis of a May 10, 1983, request from the Chairman, Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce, and subsequent discussions with his staff, we reviewed EPA's stationary source inspection program to determine

- the legislative and EPA requirements governing inspection frequency and depth (degree of detail or comprehensiveness) and these requirements' reasonableness and adequacy,
- whether inspections performed by EPA and the states were frequent enough and of sufficient depth to provide adequate assurance that the Clean Air Act requirements are being met, and
- the reasons given by EPA and state/local agencies for the frequency and depth of actual inspections.

With the assistance of the national organization representing state and local air pollution program administrators, we identified 207--50 state, 5 territorial, and 152 local--air pollution control agencies with inspection responsibilities. We attempted to obtain information from all 207 identifying (1) whether agencies were meeting their inspection responsibilities and reasons for not meeting them, (2) the number and academic background of inspectors, and (3) the availability and adequacy of inspector training.

We also requested inspection frequency and depth information from these agencies for 835 specific sources within their jurisdiction such as a 2-year compliance and complaint history, the number of inspections performed in a given time period, and the type of the source's pollution control equipment.

To determine whether the frequency and depth of state/local inspections were sufficient to determine compliance with Clean Air Act requirements, we hired a consultant--PEI Associates, Inc.--which had previously developed such a methodology for EPA (see p. 15). Established in 1970 PEI provides environmental engineering, monitoring, and inspection training services to environmental and industrial clients in air pollution as well as other fields. In fiscal year 1984 PEI, headquartered in Cincinnati, Ohio, with five branch offices nationwide, had approximately a \$1.1-million contract with EPA to provide various services. We did our work with the Durham, North Carolina, office because it had developed the inspection criteria for EPA.

We also contacted air compliance officials from each of the 10 EPA regional offices to obtain information primarily on (1) the sources that state/local agencies were responsible to inspect but did not and (2) the sources that EPA was to inspect because a state/local agency had not been delegated the responsibility.

We also interviewed officials who managed EPA's Stationary Source Compliance Division located at EPA headquarters in Washington, D.C., and EPA's Office of Air Quality Planning and Standards located at Research Triangle Park, North Carolina.

Slide I.4**METHODOLOGY OF GAO STUDY**

- QUESTIONNAIRE DEVELOPED AND SENT TO STATE AND LOCAL AGENCIES
- QUESTIONNAIRE DATA INCLUDED
 - NUMBER OF INSPECTIONS PERFORMED
 - DEPTH OF INSPECTIONS PERFORMED
 - POLLUTANTS EMITTED
 - NUMBER OF VIOLATIONS FOUND AND COMPLAINTS FILED
- GAO CONTRACTOR REVIEWED SELECTED QUESTIONNAIRES

SAMPLE STATISTICS

	<u>A1/A2</u>	<u>NESHAP</u>	<u>TOTAL</u>
UNIVERSE OF SOURCES	28,803	1,083	29,886
SOURCES IN SAMPLE	480	355	835
VALID RESPONSES RECEIVED	340	215	555
RESPONSES REVIEWED BY CONTRACTOR	170	215	385

METHODOLOGY OF GAO STUDY

We gathered our information primarily through two questionnaires. We sent one to 207 pollution control agencies to obtain program information. We developed a second one to obtain inspection frequency and depth information for specific sources, sending it to the state/local agency responsible for their inspection.

We used EPA's Compliance Data System (CDS), its computer system containing information on stationary sources, to identify 29,886 operating stationary sources as of September 1984 that emit or have the potential to emit regulated pollutants in sufficient quantity to warrant inspection. Because the universe of 29,886 was too large, we selected a statistically valid sample from which we could make estimates about the universe.

To select the sample, we stratified the 29,886 sources into two groups--A₁/A₂ sources that emit criteria pollutants and NESHAP sources that emit hazardous pollutants--and selected a statistically valid sample from each. We mailed questionnaires for these samples to the state/local agencies responsible for their inspection. Our response statistics are shown below:

<u>Strata</u>	<u>Question- naires mailed</u>	<u>Question- naires returned</u>	<u>Unanswered questionnaires returned</u>	<u>Valid questionnaires used in analysis</u>
A ₁ /A ₂	480	436	96	340 (71%)
NESHAP	<u>355</u>	<u>323</u>	<u>108</u>	<u>215</u> (61%)
Total	<u>835</u>	<u>759</u>	<u>204</u>	<u>555</u>

A total of 204 questionnaires were returned unanswered due mainly to errors in the CDS database. For example, we asked agencies whether a source classified on CDS as a NESHAP was in

fact a NESHAP. If it was not, the respondent was told to return the questionnaire unanswered. About 60 percent of the returned unanswered questionnaires were unanswered for this reason. In other cases, we sent questionnaires to agencies responsible for inspecting a source that had been out of business since as far back as 1979. CDS had listed these sources as operational. About 13 percent of the returned unanswered questionnaires were unanswered for this reason.

We decided that PEI should review a 50-percent sample of the questionnaires completed by the agencies on specific sources because this was a cost-effective approach allowing us to make estimates about the universe. Consequently, PEI reviewed 170 A₁/A₂ questionnaires (a 50-percent random sample of the 340 returned). However, we had PEI review all 215 of the returned NESHAP questionnaires because taking a sample would have resulted in estimates with higher than desired sampling errors.

Because we used a sample, we had to determine the number of sources in the universe that were represented by each of our source-specific questionnaires. We computed this "weighting factor" by dividing the universe for each strata by the sample size for that strata. For example, because our universe of A₁/A₂ sources was 28,803 and our sample drawn from this universe was 480, each A₁/A₂ questionnaire represented 60 sources in the universe (28,803/480). Although we received only 340 completed A₁/A₂ questionnaires, each is still weighted by a factor of 60 to make estimates to the universe.

As an example of how the weighting factor worked, 230 of the A₁/A₂ questionnaires responded that particulates were emitted from the specified facility in sufficient quantity to quality for an A₁/A₂ source. This meant that 13,800 (230*60) facilities in our universe emitted particulates.

Because PEI analyzed 50 percent (170) of the returned A₁/A₂ questionnaires, the weighting factor of 60 was doubled to 120 so that we could still make estimates about the universe of A₁/A₂ sources.

We used the same method to calculate the weighting factor of the NESHAP source-specific questionnaires. By dividing the universe of 1,083 by the sample of 355, each of our NESHAP questionnaires represented 3 NESHAP sources in the universe. Although only 215 completed questionnaires had been returned, each questionnaire is still weighted by a factor of 3. Because PEI analyzed all 215 of the answered NESHAP questionnaires, our estimates made from its analysis were also weighted by a factor of 3.

Slide I.5**CONTRACTOR METHODOLOGY**

- **CRITERIA USED**
 - **TYPE OF CONTROL EQUIPMENT**
 - **TYPE OF SOURCE**
 - **TYPE OF EMISSIONS**
 - **MALFUNCTION/BREAKDOWN HISTORY**
 - **COMPLIANCE HISTORY**
- **CRITERIA APPLIED TO DETERMINE INSPECTION ADEQUACY**

CONTRACTOR METHODOLOGY

PEI reviewed each of the 385 source-specific questionnaires to identify the type of source that was inspected. PEI determined that some source categories required only a visible emission check because these sources did not have pollution control equipment and/or there were little if any data to collect and evaluate. For example, industrial space heaters generally require only a visible emission check.

Each of the remaining sources in the questionnaires required at least a records review. PEI used criteria similar to that which it had developed under a June 1981 EPA contract to determine whether a more in-depth inspection was warranted. These criteria considered (1) the type of source, (2) the source's type of pollution control equipment, (3) type of emissions, (4) the source's violation/complaint history, and (5) the source's malfunction/breakdown history. For example, PEI generally recommended detailed engineering analyses for sources whose control equipment had a previous history of violations or malfunctions. However, if the control equipment had no history of violations, PEI recommended a records review.

PEI used the same criteria to determine an adequate frequency of inspection. For example, PEI generally recommended an increased inspection frequency for sources with potential control equipment failure. This could be the case with coal-fired boilers that sometimes operate at too high a temperature, causing the control equipment to fail.

After determining an inspection frequency and depth for each facility, PEI compared this to what had actually been done and determined if the inspection effort had been sufficient or a change was necessary. PEI did not make a determination for facilities not inspected or not operating during the designated time period (primarily fiscal year 1984 but fiscal year 1983 in cases with biennial inspections.)

Slide I.6**PROVISIONS OF CLEAN AIR ACT
RELATING TO STATIONARY
SOURCE INSPECTIONS**

- **FOR PURPOSES OF DETERMINING CLEAN AIR ACT VIOLATIONS BY A STATIONARY SOURCE, EPA**
 - **HAS THE RIGHT OF ENTRY TO THE PREMISES**
 - **SHALL HAVE ACCESS TO RECORDS**
 - **MAY INSPECT THE MONITORING EQUIPMENT**
 - **MAY SAMPLE EMISSIONS**
- **EPA MAY DELEGATE TO STATES AUTHORITY TO PERFORM INSPECTIONS**
- **ACT IS SILENT ON FREQUENCY AND DEPTH OF INSPECTIONS**

PROVISIONS OF CLEAN AIR ACT RELATING
TO STATIONARY SOURCE INSPECTIONS

The Clean Air Act is the federal law designed to protect the nation's health and welfare from the adverse effects of air pollution. The 1970 amendments to the act gave EPA the initial authority to investigate sources subject to emission requirements.

Section 114(a) of the 1970 amendments states that the EPA Administrator may require any person who owns or operates any stationary source(s) subject to provisions of the act to maintain records and install, use, and maintain monitoring equipment. EPA has the right of entry to regulated facilities and has access to the records that the operator is required to keep. In addition, EPA has the right to inspect any monitoring equipment and sample any emissions that the owner or operator is required to sample.

Section 114(b) provides that the EPA Administrator may delegate the authority to perform inspections to state air pollution control agencies. Most local agencies receive this authority from the state in which they are located. In this case, they are accountable to that state for performing inspections. Some local agencies receive inspection responsibilities directly from EPA and are ultimately responsible to EPA for ensuring that inspections are done.

Although the Clean Air Act gives EPA the authority to inspect stationary sources and to delegate that authority to the state and local agencies, neither the act nor its implementing regulations address how often inspections should be done and at what depth.

Slide I.7**EPA INSPECTION GUIDANCE
EMPHASIZES FREQUENCY**

- ANNUAL INSPECTIONS RECOMMENDED FOR ALL SOURCES UNTIL 1980
- MARCH 1980 REVISION RECOGNIZED DISTINCTION BETWEEN A₁ AND A₂ SOURCES AND ALLOWED BIENNIAL INSPECTIONS FOR A₂ SOURCES
- FY 85 GUIDANCE ALLOWED SEASONAL A₁ SOURCES TO BE INSPECTED ONCE EVERY 5 YEARS AND ALLOWED STATES TO DIVERT RESOURCES FROM A₂ INSPECTIONS TO MORE FREQUENT INSPECTIONS OF OTHER SOURCES
- FY 86 GUIDANCE ISSUED MARCH 1985
 - PROVIDES THREE ADDITIONAL EXCEPTIONS
 - FOR THE FIRST TIME SPECIFIES WHAT IS TO BE CONSIDERED A MINIMALLY ACCEPTABLE INSPECTION

EPA INSPECTION GUIDANCE
EMPHASIZES FREQUENCY

Prior to 1980 EPA's inspection guidance recommended that all major (A₁ and A₂) stationary sources be inspected at least once annually. In March 1980 EPA issued revised inspection frequency guidance that specified at least annual inspections of A₁ and NESHAP sources and at least biennial inspections of A₂ sources. However, state/local agencies may conduct more frequent inspections of a source if they deemed it warranted.

EPA's fiscal year 1985 guidance, issued February 1984, allowed several exceptions because of reduced funding for air pollution control programs and the increasing complexity of the air pollution program. An exception to the annual inspection requirement was permitted if the EPA regional office and the state agreed that a source's production was (1) either constrained by an operating permit that limited the hours of production or (2) seasonal in nature and ongoing only a few weeks per year. Grain elevators and alfalfa dehydrators are examples of possible exceptions. The guidance specified, however, that all such excepted sources be inspected at least once every 5 years. Beginning also in fiscal year 1985, a state could defer A₂ biennial inspections for up to 5 years and concentrate on other sources with a high potential for violating emissions standards, provided it committed the same level of resources as would be required to inspect all A₂ sources biennially.

In December 1984 EPA and state/local officials discussed the need for EPA to define an acceptable inspection. EPA, for the first time, provided such a definition in its March 1985 guidance, defining a minimally acceptable inspection as a visible emissions check combined with a review of plant records, readings of source-maintained control equipment, and observations of process operating equipment.

The March 1985 guidance, effective for fiscal year 1986, provided three additional exceptions for sources designated for annual inspections--gas-fired combustion facilities regulated only for sulfur dioxide emissions, certain gas turbines, and industrial boilers that were classified A₁ only because of their sulfur dioxide emissions.

Slide 1.8

EPA CONTRACTOR ESTABLISHES CRITERIA FOR INSPECTION DEPTH

- **EPA CONTRACTOR DIFFERENTIATES LEVELS OF INSPECTION EFFORT**
 - **VISIBLE CHECK OF EMISSIONS (PLUME OPACITY) FROM STACKS**
 - **VISIBLE CHECK PLUS A REVIEW OF RECORDS, CONTROL DEVICES, AND PROCESS OPERATING CONDITIONS**
 - **DETAILED ENGINEERING ANALYSIS TAKING ACTUAL MEASUREMENTS**
 - **STACK TEST WITH MONITORS AND PROBES**
- **VIRGINIA STUDY COMPLETED APRIL 1983**
 - **INSPECTIONS GENERALLY CONSISTED OF VISIBLE CHECKS ONLY**
 - **DETAILED ENGINEERING ANALYSIS OF 36 SOURCES SHOWED 12 IN VIOLATION AND ANOTHER 10 WITH O&M PROBLEMS THAT COULD LEAD TO VIOLATIONS**
 - **STATE OFFICIALS AGREED WITH THE STUDY RESULTS AND CONCLUSIONS**

EPA CONTRACTOR ESTABLISHES
CRITERIA FOR INSPECTION DEPTH

In April 1983 PEI, under contract with EPA, analyzed the inspection program in an 18-county region of Virginia. Part of the study determined what level of inspection should have been done at the stationary sources to best determine their compliance status. PEI defined the following levels of inspections.

- Visible emissions. This level is a screening inspection to identify violations of visible emission standards. The inspector determines how much light is blocked by the smoke plume and compares it with the standard.
- Records check plus a visible emissions check. This level involves recording control device and process operating conditions such as temperatures, water pressure, and power levels to determine if any significant changes had occurred since the last inspection or if any process operations are outside normal conditions (EPA's March 1985 definition of a minimally acceptable inspection).
- Detailed engineering analysis. PEI considered this level necessary to determine the compliance of sources having control equipment with a history of violations or malfunctions. It includes measuring operating parameters (e.g., power levels, gas temperature, pressure drop, and water flow rate) and calculating additional parameters to determine if (1) the source is operating within accepted design conditions and (2) the source has operation and maintenance problems that may prevent continued compliance with emissions standards. This a more thorough, time-consuming inspection because the inspector takes readings rather than relying on the source's.
- Analysis of extracted emissions (stack test). This level requires insertion of a tube into the smokestack and taking a sample of the emissions for analysis. This is the highest level of inspection.

Using its criteria (discussed on p. 15) PEI determined what inspection frequency and depth should have been done at the 105 A₁/A₂ stationary sources located in the 18 Virginia counties. PEI identified 84 sources that should have had a detailed engineering analysis but received only a state evaluation of visible emissions or records check. PEI-trained state inspectors then did detailed engineering analyses at 36 sources. They found 12 sources in violation that would not have been detected if only an evaluation of visible emissions or a records check had been done and another 10 that, although in compliance, had operation and maintenance problems that could have led to violations. The contractor determined that these problems would not have been detected by doing only an evaluation of visible emissions. State officials agreed.

In October 1984 EPA awarded another contract to PEI to develop a plan to identify the appropriate inspection frequency and depth for sources throughout Virginia. In addition, EPA and another environmental contractor are planning a pilot project in Colorado and Michigan. The pilot will allow states to prioritize the frequency and depth of inspections for sources with a high potential for violating emission standards. The Director of EPA's Stationary Source Compliance Division stated that about a year's preliminary data gathering and planning are still necessary and that the pilot project will not be implemented until fiscal year 1987.



Slide I.9

MANY REQUIRED INSPECTIONS WERE INADEQUATE

	<u>A₁/A₂</u>	<u>NESHAP</u>	<u>TOTAL</u>
UNIVERSE OF SOURCES	28,803	1,083	29,886
ESTIMATED SOURCES EXCLUDED DUE TO NON-RESPONSE OR INVALID RESPONSES	<u>8,400</u>	<u>420</u>	<u>8,820</u>
UNIVERSE BASE FOR ESTIMATES	20,403	663	21,066
ESTIMATED SOURCES NOT INSPECTED BECAUSE NOT OPERATING	<u>540</u>	<u>27</u>	<u>567</u>
ESTIMATED SOURCES OPERATING THAT SHOULD BE INSPECTED	19,863	636	20,499
ESTIMATED SOURCES ADEQUATELY INSPECTED (%)	11,283 (56.8)	402 (63.2)	11,685 (57.0)
ESTIMATED SOURCES INADEQUATELY INSPECTED (%)	8,580 (43.2)	234 (36.8)	8,814 (43.0)

MANY REQUIRED INSPECTIONS
WERE INADEQUATE

Of the 29,886 sources identified on EPA's CDS as of September 1984, we were able to estimate to a universe of only 20,499 sources. This decrease was required because 8,820 questionnaires were either not returned or were returned unanswered, and 567 other sources were not operating.

On the basis of PEI's analysis, we estimated that 8,814 (43 percent) of the sources had been inadequately inspected because the inspections had not been done frequently enough and/or not done at sufficient depth, or at all. Therefore, by subtracting the 8,814 sources being inadequately inspected from our 20,499 universe base, we estimated that 11,685 sources (57 percent) had been adequately inspected.

Estimates made from sample statistics were assigned a confidence level prior to selecting the sample--95 percent for the estimates from our source-specific questionnaires. This means that chances are 95 out of 100 that if we had sent questionnaires to all stationary sources, the results obtained would not have differed from those obtained through our sample by more or less than what is called the sampling error of the estimates.

Because we used a statistical sample to obtain our source-specific information, estimates made from the questionnaire results have a measurable sampling error. The sampling error is the maximum amount by which the numbers obtained from the statistical sample can be expected to differ from the universe of numbers. It is presented as a range (plus or minus a certain number). The percentages of inspections that were adequate and inadequate--57 and 43 respectively--have a percent sampling error of 7.2. The sampling errors for the other numbers presented in this appendix are given in appendix II.

Slide I.10**INADEQUATE INSPECTIONS**

	<u>A₁/A₂</u>	<u>NESHAP</u>	<u>TOTAL</u>
ESTIMATED FREQUENCY CHANGE REQUIRED <u>ONLY</u>	3,000	18	3,018
ESTIMATED DEPTH CHANGE REQUIRED <u>ONLY</u>	1,680	168	1,848
ESTIMATED <u>BOTH</u> FREQUENCY AND DEPTH CHANGE REQUIRED	2,880	18	2,898
ESTIMATED SOURCES NOT INSPECTED	<u>1,020</u>	<u>30</u>	<u>1,050</u>
TOTAL ESTIMATED INADEQUATE INSPECTIONS	<u>8,580</u>	<u>234</u>	<u>8,814</u>

INADEQUATE INSPECTIONS

We estimated on the basis of PEI's work, that 8,814 stationary sources received inadequate inspections. Of these, 3,018 were not inspected frequently enough, 1,848 were not inspected at a sufficient depth, another 2,898 were inspected both too infrequently and at an insufficient depth, and 1,050¹ were not inspected at all.

In our discussions in later charts, we have taken the 2,898 sources requiring inspections of both an increase in frequency and more depth and added them to those requiring only a frequency or depth change. As a result, a total of 5,916 sources were not inspected frequently enough and a total of 4,746 sources were not inspected in sufficient depth.

¹While this number of uninspected sources is based on the 20,499 operating sources we estimated that should be inspected (see p. 25), the numbers on page 43--1,478 sources uninspected out of a total of 29,886 sources--are actual.

Slide I.11**ESTIMATED SOURCES WITH
RECOMMENDED FREQUENCY
CHANGES**A₁/A₂NESHAPTOTAL5,880365,916

ESTIMATED SOURCES WITH
RECOMMENDED FREQUENCY CHANGES

On the basis of PEI's work, we estimated that the number of sources not inspected frequently enough in fiscal year 1984² totaled 5,916. These were inspected either (1) once but according to PEI should have had two inspections or (2) twice but according to PEI should have had three inspections. For example, one facility, to which a notice of violation had been issued and the subject of a public complaint, was inspected only once in fiscal year 1984. PEI recommended that the source should have had two inspections. In another case where the inspecting agency had received six complaints about the source, PEI recommended that an additional inspection may have helped determine the reason for the complaints.

In addition to not being inspected frequently enough, 969 sources were found to have had too many inspections. For example, according to PEI one facility without any potential process or control equipment problems had received seven inspections in fiscal year 1984. PEI found no need for seven inspections and recommended that they be reduced to two or three.

²Generally, the information was for inspections done in fiscal year 1984. However, EPA specified some stationary sources for only a biennial inspection. Therefore, inspection information on some of these was from fiscal year 1983.

Slide I.12**WHY SOME STATIONARY SOURCES
WERE NOT INSPECTED
FREQUENTLY ENOUGH**

- EPA GUIDANCE REQUIRES NO MORE THAN ONE INSPECTION PER YEAR
- STATE INSPECTORS DID OTHER THAN EPA-DELEGATED INSPECTIONS

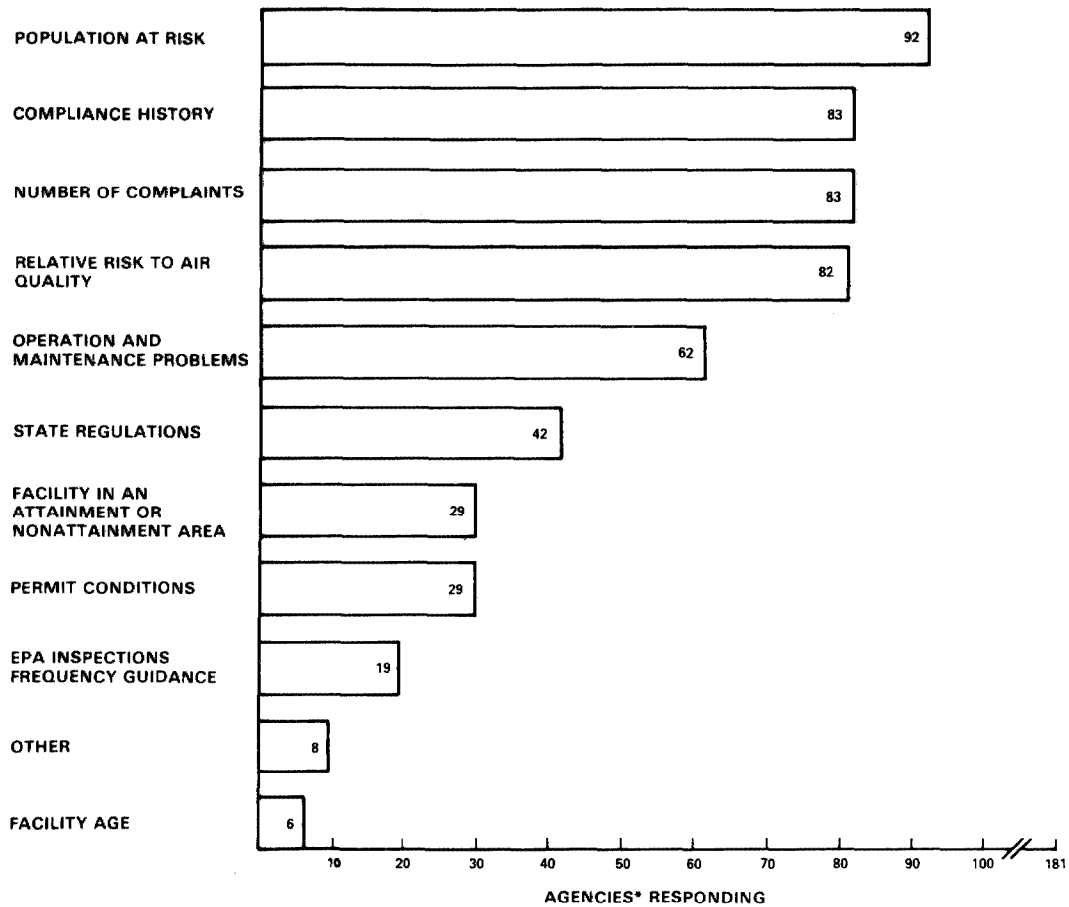
WHY SOME STATIONARY SOURCES WERE
NOT INSPECTED FREQUENTLY ENOUGH

Our analysis of EPA's inspection guidance and the responses to our program questionnaire indicate possible reasons for state and local agencies not inspecting stationary sources more frequently. One possible reason is that EPA's guidance requires no more than one inspection per year. Although the state/local agencies may do additional inspections, some must contend with limited staffing resources (see p. 41) and competing demands when deciding on inspections.

In regard to the competing demands, 50 percent of the responding agencies said that their inspectors spend about 30 percent or less of their inspection time doing EPA-delegated inspections and the remainder on other matters. Other inspector responsibilities include resolving citizen complaints against stationary sources (often odor complaints), inspecting smaller sources not tracked by EPA but under state regulations, and inspecting for pending enforcement action.

Slide I.13

FACTORS THAT WOULD RECEIVE VERY GREAT EMPHASIS IF PRIORITIES COULD BE REESTABLISHED



*181 STATE AND LOCAL AGENCIES IN SAMPLE

FACTORS THAT WOULD RECEIVE
VERY GREAT EMPHASIS IF
PRIORITIES COULD BE REESTABLISHED

In our program questionnaire, we asked what factors would be given "very great emphasis" if state and local agencies could reestablish their priorities. Only 19 of the 181 agencies said that they would place very great emphasis on EPA guidance. Ninety-two responded that the population at risk would receive very great emphasis.

Two other factors considered very important by 83 agencies were a source's compliance history and the number of complaints filed against a source. Finally, 82 agencies said that sources that posed a relatively high risk to air quality would be given very great emphasis.

Slide I.14**ESTIMATED SOURCES WITH
RECOMMENDED DEPTH CHANGES**

	<u>A₁/A₂</u>	<u>NESHAP</u>	<u>TOTAL</u>
FROM VISIBLE CHECK TO RECORDS REVIEW	1,800	54	1,854
FROM VISIBLE CHECK OR RECORDS REVIEW TO ENGINEERING ANALYSIS	2,760	132	2,892
	_____	_____	_____
TOTAL	<u>4,560</u>	<u>186</u>	<u>4,746</u>

ESTIMATED SOURCES WITH
RECOMMENDED DEPTH CHANGES

On the basis of PEI's analysis of the source-specific questionnaires, we estimated that 4,746 sources should have had inspections of greater depth. For 1,854 of these sources, we estimated that an inspection should not only consist of a visible emissions check but also of a review of plant records, readings of source-maintained control devices, and observations of process operating conditions. (We refer to this level as a records review although it also includes a visible emissions check.) We estimated that another 2,892 sources, which had received either visible emissions or records review inspections, should have had a detailed engineering analysis to adequately determine compliance.

Slide I.15**EPA/STATE WORKING AGREEMENTS
DO NOT ADDRESS DEPTH**

- **129 OF 163 AGENCIES (79%) SAID AGREEMENTS DID NOT ADDRESS DEPTH**
- **34 SAID DEPTH ADDRESSED TO SOME DEGREE**
- **GAO ANALYSIS OF 16 OF 34 AGREEMENTS SHOWED ONLY ONE ADEQUATELY ADDRESSED DEPTH**

EPA/STATE WORKING AGREEMENTS
DO NOT ADDRESS DEPTH

Our questionnaire asked the state and local agencies if their annual agreements with EPA addressed the depth of inspections to be performed. While most inspection agencies did each of the levels of inspection defined by PEI and, in fact, did the level of inspection prescribed by PEI in about 77 percent (15,689 of 20,435) of the cases, of the 163 agencies that responded,³ 129 (79 percent) said their agreements with EPA did not address depth. We asked the other 34 to send us those parts of the agreements that addressed depth. Of the 16 received, we found that only one agreement addressed depth at length in that it specified the number of visible emission checks and detailed engineering analyses the agency expected to do as part of its routine compliance activities.

Of the other 15 agreements we received, 6 contained very limited discussion on the use of stack tests. In general, these agreements gave the agencies the option of doing stack tests when the agency felt it was necessary. In fiscal year 1984, on an average, 8.5 percent of the inspections these agencies did were stack tests.

³Some agencies did not respond to each of the questions. This is why the number of responding agencies referred to here and on page 39 differ.

Slide I.16**TRAINING CITED AS ANOTHER
REASON FOR NOT DOING MORE
IN-DEPTH INSPECTIONS**

- **FUNDING AVAILABILITY CITED MOST FREQUENTLY AS MAJOR REASON LIMITING ATTENDANCE AT TRAINING PROGRAMS**
- **OVER HALF THE AGENCIES BELIEVED TRAINING PROVIDED WAS NOT ADEQUATE TO TEACH INSPECTORS TO DO DETAILED ENGINEERING ANALYSIS OR STACK TESTS**
- **EPA COURSES BEING CUT BACK**

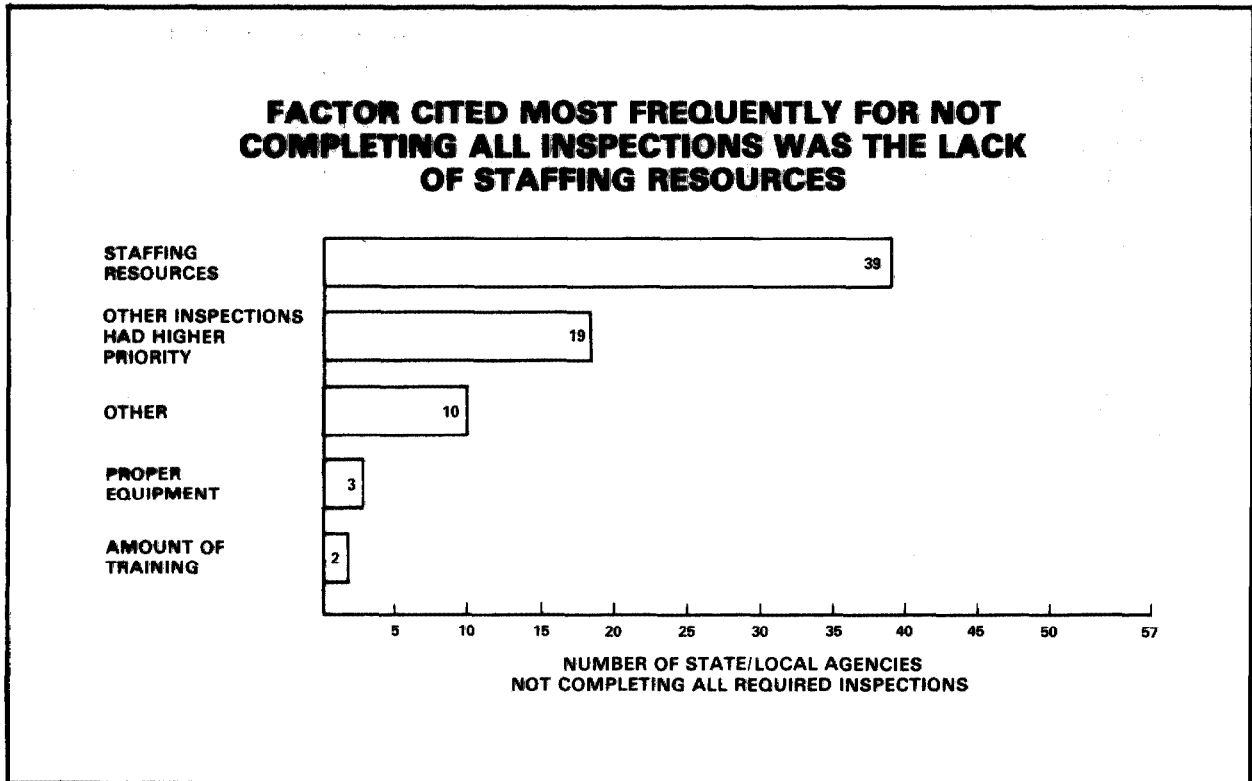
TRAINING CITED AS ANOTHER REASON FOR
NOT DOING MORE IN-DEPTH INSPECTIONS

State and local agencies responded to our program questionnaire that they are heavily dependent on EPA training. However, a lack of funds for training (124 of 179 responding agencies) and limited travel funds (131 of 180 responding agencies) were major reasons limiting attendance at EPA's training programs. Further, 97 of 172 responding agencies said that not enough courses were offered to adequately teach inspectors how to do detailed engineering analyses.

According to EPA, the quality of its training courses is likely to decline and those retained will not be updated. Until fiscal year 1985 EPA's Air Pollution Training Institute--responsible for EPA's basic training courses--employed a contractor to keep the training courses current with new technology. However, EPA contract funds for fiscal year 1985 were reduced to zero--as compared with \$998,000 in fiscal year 1981--and therefore course development and revision will halt since EPA does not have the in-house capability.

In addition to the training institute efforts, other courses are developed and their presentations funded by EPA headquarters. However, because funding was reduced from \$1.1 million for fiscal year 1984 to \$200,000 for fiscal year 1985, any workshops will have to be voluntarily funded by the regional offices.

Slide I.17



FACTOR CITED MOST FREQUENTLY FOR
NOT COMPLETING ALL INSPECTIONS WAS
THE LACK OF STAFFING RESOURCES

Of the 181 agencies responding to our questionnaire, 57 did not complete all of the inspections they had agreed to do. We asked them what factors contributed to their not doing all of the inspections. Thirty-nine (68 percent) responded that staffing resources was the biggest factor. EPA officials recognize that more frequent and in-depth inspections will require a large commitment of staff resources, and EPA is evaluating a system to prioritize the frequency and depth of inspections for sources with a high potential for violating emissions standards.

Another 19 (33 percent) responded that the biggest factor was that other inspections had higher priority. In addition, 3 (5 percent) and 2 (3.5 percent) responded that lack of proper equipment and amount of training, respectively, were the biggest factors.

Slide I.18

MOST SOURCES INSPECTED BUT EPA FALLING SHORT IN ITS REQUIRED INSPECTIONS

REGION	ESTIMATED SOURCES REQUIRING INSPECTIONS	DELEGATED INSPECTIONS		NON-DELEGATED INSPECTIONS	
		INSPECTIONS NOT DONE BY STATES	INSPECTED BY EPA	INSPECTIONS REQUIRED	INSPECTIONS DONE
1	1,264	351	178	50	50
2	3,238	150	0	149	139
3	2,918	166	4	0	0
4	5,715	0	0	0	0
5	5,960	400	75	0	0
6	3,194	91	0	14	14
7	3,160	140	0	368	74
8	1,506	25	0	10	5
9	1,700	8	0	29	0
10	1,231	66	0	0	0
TOTAL	<u>29,886</u>	<u>1,397</u>	<u>257</u>	<u>620</u>	<u>282</u>
		1,140 UNINSPECTED (81.6%)		338 UNINSPECTED (54.5%)	

MOST SOURCES INSPECTED
BUT EPA FALLING SHORT
IN ITS REQUIRED INSPECTIONS

As of September 1984 EPA had records on 29,886 operating stationary sources. Of these, according to regional office air pollution control officials, 1,478 sources, or about 5 percent, had not been inspected.

EPA guidance requires EPA regional offices to inspect sources that have been delegated to state/local agencies but were not inspected by these agencies. According to regional office officials, these sources totaled 1,397 in fiscal year 1984. However, regional officials stated that just 257 (18.4 percent) had been inspected by the regional offices.

EPA guidance also states that its regional offices are also responsible for inspecting sources that have not been delegated to state/local agencies. According to EPA regional officials, in fiscal year 1984, 620 such sources existed of which the regional offices inspected 282 (45.5 percent).

In total, the EPA regional offices were responsible for inspecting 2,017 sources but actually inspected 539 (26.7 percent). Regional office officials cited staffing resources as a reason for not doing more inspections. Another reason was that EPA does not know soon enough whether the state or local agencies are going to complete all of their delegated inspections. EPA also said that it is difficult to get to sources located in remote areas in order to conduct an inspection. Finally, EPA regional office officials said that the higher priority given other tasks, including preparing for an enforcement action, precluded them from performing all of their inspections.

ESTIMATES AND RELATED SAMPLING ERRORS

<u>Description of estimate</u>	<u>Page reference</u>	<u>Estimate</u>	<u>Sampling error¹</u>
Non-response and unanswered responses	24	8,820	1,162
Estimated universe	24	21,066	1,162
Non-operating sources ²	24	567	520
Operating sources that should have been inspected	24	20,499	1,686
Sources adequately inspected	24	11,685	1,776
Sources inadequately inspected	24	8,814	1,667
Frequency change required only	26	3,018	1,111
Depth change required only	26	1,848	853
Frequency and depth change, both required	26	2,898	1,091
Sources not inspected ²	26	1,050	653
Total sources with recommended frequency changes	28	5,916	1,466
Depth change from visible check to records review	34	1,854	880
Depth change from visible check or records review to engineering analysis	34	2,892	1,069
Total sources with recommended depth changes	34	4,746	1,328
Number of sources in EPA Region:			
1	42	1,264	511
2	42	3,238	781
3	42	2,918	760
4	42	5,715	1,010
5	42	5,960	1,019

<u>Description of estimate</u>	<u>Page reference</u>	<u>Estimate</u>	<u>Sampling error¹</u>
6	42	3,194	794
7	42	3,160	794
8	42	1,506	568
9	42	1,700	579
10	42	1,231	511

¹Sampling errors stated at the 95 percent level of confidence.

²This estimate should be used with caution because the sampling error is greater than one-half the estimate.





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