June 25, 1999

MEMORANDUM

SUBJECT: Laboratory Fraud: Deterrence and Detection

TO: Peter D. Robertson
Acting Deputy Administrator

Subsequent to a voluntary disclosure to the Agency regarding data integrity problems at a company laboratory, Fred Hansen, then Deputy Administrator, requested that we determine what the Agency could do to detect and prevent fraudulent activities. We worked closely with cognizant Agency staff during this study. Their comments and opinions are included in this revised version of the attached summary.

We recognize that fraud, in any environment, cannot be completely prevented. However, there are several steps the Agency can take to provide greater assurance that laboratory fraud will be deterred and detected. Some of the steps discussed in the summary are listed below.

- ❑ Provide training for Agency or state on-site auditors/inspectors, as well as individuals responsible for reviewing laboratory data, that would incorporate fraud detection techniques into their daily work. In addition, update and enforce guidance for oversight officials to incorporate fraud awareness techniques.

- ❑ Promote ethics in environmental testing laboratories through outreach and training.

- ❑ Pursue and publicize all means of providing individuals performing environmental testing with appropriate contacts to report possible misconduct (e.g., OIG Hotline).

- ❑ Explore emerging electronic methods for screening laboratory data. In addition, assume a leadership role on the standardization of electronic data deliverables.

- ❑ Incorporate accreditation, or a quality system demonstration, among the mandatory requirements in all program areas.

- ❑ Develop or improve guidance and training specific to the planning process to assist data users in determining laboratory QA/QC necessary and appropriate for the intended use of the data.

- ❑ Ensure information systems used to track laboratory data are current and complete. Review the feasibility of implementing such systems in programs that do not currently have such systems.

During this study, we identified issues that we believe warrant further attention by our office and the Agency in addressing fraud in environmental testing laboratories. We look forward to the opportunity to continue this cooperative effort and are willing to work with you in addressing these issues. If you have any questions, please give me a call.

Nikki L. Tinsley \s\

Attachment

Laboratory Fraud: Deterrence and Detection

Fraudulent practices in environmental testing laboratories are a problem that EPA and other federal agencies have been faced with for many years. Most recently, a company voluntarily disclosed to EPA data integrity problems at one of its laboratories. After further Agency review, potential data fraud has been identified for sample analyses conducted since 1991 for the Superfund, Resource Conservation and Recovery Act (RCRA), Air Toxics, well water and groundwater monitoring, underground storage tank clean-up, National Pollutant Discharge and Elimination System and pesticides programs. The most serious result of the potential fraud is the possibility that false negatives were reported, i.e., the laboratory could have reported certain potentially hazardous compounds as not being present when they actually were present. As a result, thousands of separate analytical projects performed by this laboratory may be impacted. The investigation of the alleged fraud in this case and its impact on Agency decisions is ongoing.

As a result of this case, the former Deputy Administrator, Fred Hansen, asked the OIG to help the Agency determine how activities, such as those at this lab, can be detected and prevented in the future. In response to this request, we conducted a review, in cooperation with the Agency, to determine what can be done in the future to deter and detect fraud at environmental testing laboratories. The integrity of data can be impacted throughout sample collection, handling, and analysis. However, we limited this review to laboratory procedures and data review. See "Scope and Methodology" section at the end of the report for additional information.

Factors Contributing to Laboratory Fraud

Laboratory fraud has been defined by the Agency as "the deliberate falsification of analytical and quality assurance results, where failed method and contractual requirements are made to appear acceptable." There are a number of laboratory practices which may constitute fraud. The following are some examples:

- ❑ Fabricating data
- ❑ Misrepresenting quality control samples
- ❑ Calibrating equipment using other than accepted procedures
- ❑ Modifying samples to alter characteristics
- ❑ Manipulating analytical results
- ❑ Substituting samples, files, or data
- ❑ Falsifying records of analytical equipment readings

Agency officials, prime contractors, and laboratory owners have identified conditions that may allow laboratory fraud to occur. The three factors mentioned include:

- Ineffective oversight of laboratory data
- Shrinking market resulting in a focus on production over quality, and
- "One size fits all" approach to analytical requirements

The first of these factors, ineffective oversight of laboratory data, has been identified as a problem in prior OIG and Agency efforts; and it continues to be of concern. Specifically, the Agency does not appear to give fraud prevention and detection adequate attention in conducting oversight. For example, we found limited guidance or training on fraud detection for laboratory auditors. In addition, a representative from one of the Agency's prime contractors stated in a paper presented at the 1998 Quality Assurance Conference in Denver:

> ...The obvious lack of environmental laboratory experience exhibited by many auditors and the absence of a uniform audit protocol that focuses on QA systems makes the current auditing practices particularly ineffective.

The second factor, a laboratory's focus on production versus quality, is influenced by circumstances over which the Agency may have little control. Some industry officials pointed to the declining market for environmental testing laboratories as a primary reason for some laboratories to focus on production versus quality. According to the head of the American Council of Independent Laboratories (ACIL) Environmental Sciences, "...the industry in 1991 was valued at $1.2 to $1.4 billion. Now it's hovering around $1 billion, representing a loss of around 2% per annum." As a result, the number of environmental testing labs has dropped from 1200 to fewer than 900. In turn, this has led to bidding wars among labs to compete for available work and cutting corners to save time and money.

The final factor, a "one size fits all" approach to quality assurance/quality control (QA/QC), was cited by government and private officials as contributing to fraud. This "one size fits all" approach occurs in contracts that defines specific QA/ QC requirements. Although aware of the requirements, in specific cases, a laboratory might view them as too stringent or too expensive. It may then decide to cut corners to save money. In this case, cutting corners would violate the contract requirements since the contract specifies the QA/QC procedures and the laboratory is being paid to follow them.

Although it is a recognized fact that fraud, in any environment, cannot be completely prevented, the Agency should provide greater assurance that fraud will be deterred and detected. Based on our review, we have made some observations and suggestions the Agency should consider to address the above-mentioned factors. In addition, we have included a discussion of the Agency's ability to efficiently assess the impact of laboratory fraud.

Ineffective Oversight of Laboratory Data

Several industry and Agency officials indicated a need for more effective oversight of laboratory data. In addition, recent OIG reports have cited problems with the oversight of laboratory data in the Superfund program. Although no amount of outside scrutiny can guarantee absence of fraud, effective oversight of laboratory data can deter and may also provide an opportunity to detect potentially fraudulent practices. We included suggestions we believe would enhance the Agency's ability, in an oversight capacity, to deter and detect laboratory fraud. These include updating guidance and training on the detection of laboratory fraud and applying such training to daily laboratory activities. Other factors include promoting ethics among environmental testing laboratories, ensuring laboratory employees performing environmental testing know where to report potential fraud, and using automated quality assurance tools.

Guidance and Training

On several occasions, the Agency has addressed the need for practices to better detect and deter laboratory fraud. However, these practices have been developed by individual programs and their implementation appears to be limited. For example, in 1989 a workgroup consisting of Superfund Contract Laboratory Program (CLP) management personnel and Quality Assurance Managers from the Regions was formed. This workgroup was tasked with identifying means by which fraud could be detected during routine oversight and with suggesting ways to discourage fraud in the future. The final product was a document entitled *Suggestions for Detecting and Discouraging Fraud in the CLP, January 12, 1990.* The workgroup's report included a number of suggestions for improving oversight, some of which we believe have applications outside of CLP and merit further attention by the Agency. These include:

- developing a standard operating procedure for detecting and reporting potentially fraudulent laboratory activities to be followed by all oversight personnel;
- presenting fraud awareness workshops to all EPA individuals who oversee CLP laboratories or data;
- increasing scrutiny of the data by data reviewers/validators (e.g., look for inconsistencies in the data package, check that the extraction date is earlier than the analysis date, and check that calibration data are not identical);
- developing a fraud hotline;
- developing a fraud profile checklist for on-site auditors to prompt auditors to look for indicators of potential fraud (e.g., high personnel turnover rates or stretching acceptance limits); and
- requiring use of bound laboratory notebooks.

More recently, the Agency participated in developing the California Military Environmental Coordination Committee's and Chemical Data Quality/Cost Reduction Process Action Team document *Best Practices for the Detection and Deterrence of Laboratory Fraud* (Best Practices). The objective of the document was to deter fraud and save resources by ensuring that decisions made are based on quality laboratory generated data. The Best Practices document discusses several measures to be used in concert to optimize effectiveness:

- data quality objectives planning;
- identification of QA/QC requirements in the laboratory contract;
- laboratory selection and use of phased audits;
- use of performance evaluation samples and follow-up;
- split-sample analyses;
- laboratory performance histories;
- data validation;
- electronic data/tape audits; and
- verification of a laboratory ethics program.

This document appears to have many valid suggestions for detecting and deterring laboratory fraud; however, it was developed specifically for use in a site remediation environment.

In addition to these efforts, both of which deal with the Superfund program, the Agency's Good Laboratory Practices (GLP) program discussed initiation of an inspector training program that would incorporate fraud detection in a lab setting. However, according to the Chief of the Laboratory Data Integrity Branch, which oversees the inspection of GLP laboratories, this training was last provided in 1993. In addition, we reviewed RCRA and GLP inspection manuals neither of which specifically address fraud detection. Moreover, it is our understanding that there is no standard training program for lab inspectors/auditors throughout the Agency. It appears that many EPA oversight officials (including data validators and auditors/inspectors) may not be aware of the indicators of fraud and as a result may not be well equipped to identify questionable practices.

Suggestions -

- *Modify the "Best Practices for the Detection and Deterrence of Laboratory Fraud, " California Military Environmental Coordination Committee, March 1997, Version 1.0, for use by all program offices.*

- *Provide training for on-site auditors/inspectors, as well as individuals responsible for reviewing laboratory data that would incorporate fraud detection techniques and provide modified on-site audit checklists to prompt auditors/inspectors to look for potential fraud.*

Ethics

As stated in a recent White Paper article,[1] "The biggest factor in preventing fraud is emphasizing a company's culture of integrity." In other words, management establishes the organization's values, and based on those values, employees distinguish between right and wrong. Generally these values are communicated through an organization's ethics policy or program. Thus, a key element in preventing fraud is an organization's adoption of an ethics policy that is strictly enforced. The Office of Solid Waste and Emergency Response (OSWER) has demonstrated a recognition of the importance of ethics in the laboratory. One of the courses offered at the Agency's 1998 Waste Testing and Quality Assurance (WTQA) symposium was "An Introduction to Practical Ethics for Environmental Laboratories." The course description states:

> Having employees that understand the difference between a mistake and improper behavior and that are trained to make "ethic[al] decisions" is one of the best prevention strategies. A strong reinforced ethics training program is one of the key cornerstones to an effective "total ethical process."

Although this course was canceled due to lack of participation, we commend OSWER for providing the opportunity for training and would encourage the continuation and expansion of such efforts. This is further supported by a comment from one laboratory official we spoke with who stated, "We applaud and appreciate any effort by the U.S. EPA to promote ethics in laboratory and field operations. Ethical conduct is critical to ensure the quality of environmental data and we believe that education on ethics is a key part of this process."

Suggestion -

Promote ethics in laboratories performing environmental testing and provide ethics training, such as the training offered at the WTQA symposium.

Fraud Hotline

An organization's ethics policy should include reference to an employee's responsibility to report any observation of suspicious, unethical, or illegal behavior. Employees are often in a position to observe improper conduct but are reluctant to report it for fear of retribution. According to the Association of Certified Fraud Examiners, hotlines have proven to be a very effective reporting mechanism because employees may be more comfortable calling someone not connected with their own organization. Moreover, the Association found that the majority of occupational fraud and abuse cases were discovered through tips and complaints by fellow

[1] This is a bimonthly publication from the Association of Certified Fraud Examiners. This was taken from the article "The Soft Firm - Fraud in the Professional Arena," Sept./Oct. 1998 issue.

employees rather than audits. Therefore, we believe another useful fraud prevention measure would be providing individuals performing environmental testing with appropriate contacts to report possible misconduct (e.g., OIG Hotline).

Suggestion -

Pursue and publicize all means of providing individuals performing environmental testing with appropriate contacts to report possible misconduct (One example is the OIG Hotline pocketcard which lists contacts for reporting fraud.).

Automated QA Tools

A key element in the effective oversight of laboratory data is the evaluation of analytical results through data screening or validation. During our review, we learned about various automated data processing tools that have been, or are being, developed. The applicability of these tools varies by the level of automation of the analytical procedure. One such tool developed for the Superfund program is Computer-Aided Data Review and Evaluation (CADRE). This software is only applicable to electronic data deliverables (EDD) reported by a CLP or CLP-equivalent program. In our September 1995 audit report on EPA oversight of federal facility data quality assurance, we encouraged EPA to adopt greater reliance on automated data validation for data serving as the basis for site remediation decisions. We learned that the Air Force Center for Environmental Excellence now requires EDD for analytical services under some of its contracts to enable use of automated data validation programs.

We also learned of other automated data screening tools which look for patterns in a data set that may not be predictable or observable by conventional data review techniques. "Data mining" is the collective term for these tools which use statistical algorithms to discover patterns in data. Data mining is receiving widespread attention for business and commercial applications, especially marketing. Observed patterns or anomalies within patterns can be used to trigger data validation or in-depth oversight scrutiny of laboratory results. We learned that in the case of analytical results, anomalies may result from sample matrix interference, operator error, or intentional data manipulation.

The Office of Research Integrity in the Department of Health and Human Services is protecting the integrity of U.S. Public Health Service's extramural and intramural research programs by employing data mining tools. This office oversees investigations of scientific misconduct at universities receiving PHS funds. A senior chemist with the U.S. Army Corps of Engineers told us that the Corps is preparing to impose an EDD requirement for certain analytical services which will enable them to use data mining tools.

We did not find universal support for automated laboratory data screening or evaluation. We did learn that, as with CADRE, data must be provided by a laboratory as EDD for most data mining procedures. Unfortunately, we found that there is disagreement on standardized EDD formats.

Suggestion -

Because of the potential utility of emerging technology for screening and other types of reviews of laboratory data, we believe EPA should further explore data mining methods. Similarly, we believe EPA must address the issue of standardization of EDD and assume a leadership role to achieve agreement on standardized use of EDD.

Shrinking Market for Analytical Services

According to industry officials, the market for laboratory services has been consistently shrinking over time. As a result, some laboratories are trying to improve their profit margins by focusing on production over quality. One laboratory official stated, "The balance between pricing and labor costs have been difficult to maintain." Another laboratory official noted that his laboratory has "lost money to companies that were bidding prices below his direct costs." As the profit margins decline, it becomes more difficult for laboratories to hire, train and retain qualified personnel and implement and maintain an effective QA program. Therefore, there is greater incentive for laboratories to implement cost-cutting measures.

Current market conditions highlight the need to ensure data used for decision making is only generated by qualified laboratories. One means for ensuring the use of qualified laboratories is through an environmental laboratory accreditation program. In our March 1992 Special Report, "Alternative for Ensuring Accurate Laboratory Data," we concluded that a national laboratory accreditation program would provide a baseline assurance for data integrity. We recognize that laboratory accreditation alone will not guarantee the prevention of fraudulent practices; however, we believe it is a positive step in ensuring data integrity.

The Agency has responded to the need for an accreditation program by sponsoring the National Environmental Laboratory Accreditation Conference (NELAC). NELAC is a voluntary association of state and federal officials whose purpose is to "foster the generation of environmental laboratory data of known quality in a cost-effective manner through the development of nationally accepted standards for environmental laboratory accreditation." NELAC will adopt consensus standards for quality systems, proficiency testing, audit programs, and for qualifying as an accreditation authority. As accrediting authorities, states and federal agencies will carry out the laboratory assessment function and grant accreditation based upon NELAC standards and criteria. Consistent application of the national standards will provide for reciprocity among the states and federal agencies. Laboratory accreditation will be granted based upon on-site assessment of a quality system and proficiency testing. Within ORD's Quality Assurance Division (QAD), EPA has established the National Environmental Laboratory Accreditation Program (NELAP) in support of NELAC. NELAP will oversee and report on

implementation of NELAC standards by accrediting authorities, maintain a national database on environmental laboratory accreditation, and accredit all EPA laboratories.

NELAC standards require a laboratory to demonstrate that it operates a quality system, is technically competent, and is able to generate valid results. The commercial laboratory sector appears to be supportive of laboratory accreditation as evidenced by comments submitted in response to a Federal Register Notice of Intent (63FR25430) pertaining to EPA efforts to implement a Performance Based Measurement System (PBMS)[2] for RCRA-related monitoring. ACIL, an industry trade association, stated, "The RCRA program will either need to require laboratories to be accredited under NELAC, or implement a separate program which contains the essential elements of the NELAC program. A PBMS program which does not include these elements will not be successful."

Suggestion -

Assess the benefits of incorporating NELAC accreditation, or a comparable quality system demonstration, among mandatory requirements in all program areas.

Applying Appropriate Quality Assurance/Quality Control

Unrealistic analytical requirements, or a "one size fits all" approach to QA/QC, may contribute to laboratory fraud. Eastman Chemical Company commented to EPA regarding the emphasis on assuring the highest confidence in all collected data: "EPA must allow for consideration of intended use of the data. The objective of environmental analyses is to generate data of acceptable quality for its intended use, not the generation of the highest possible quality data." According to the Best Practices document, "Appropriate QA/QC criteria should be developed to meet the individual project requirements. Too narrow or overly stringent QA/QC criteria may lead to unnecessary cost." If QA/QC requirements have been applied indiscriminately and some are viewed as unnecessary and too stringent, a laboratory may decide to cut corners on QA/QC in order to save money. In this case, cutting corners would violate the conditions of the contract since the contract specifies the QA/QC procedures, and the laboratory is being paid to follow them.

Information obtained during this review suggests appropriate planning may help the data user define more appropriate laboratory QA/QC requirements. The *EPA Quality Manual for Environmental Programs*, July 1998, requires data operations be planned using a systematic planning process. Using such a process would help the data user determine what data is needed,

[2]The Agency published a Notice of Intent in the Federal Register on October 6, 1997 (62FR52098), "to implement a Performance Based Measurement System (PBMS) for environmental monitoring in all its media programs to the extent feasible. The Agency defines PBMS as a set of processes wherein the data quality needs, mandates or limitations of a program or project are specified, and serve as criteria for selecting appropriate methods to meet those needs in a cost effective manner."

why it's needed, how it will be used and how much decision error can be tolerated. One such systematic planning process is EPA's Data Quality Objectives (DQO) Process. While not mandatory, this process is the recommended approach for many EPA data collection activities. The process is intended to minimize expenditures related to data collection by eliminating unnecessary, duplicative, or overly precise data, while assuring that data collected are of sufficient quality and quantity to support decision making. Our September 1998 report, "EPA Had Not Effectively Implemented Its Superfund Quality Assurance Program," found that the Agency does not consistently develop DQOs for data collection activities.

In February 1998, EPA issued *Guidance for Quality Assurance Project Plans (EPA QA/G-5).* This guidance explains that a Quality Assurance Project Plan (QAPP) is the critical planning document that translates *data user* requirements from the DQO Process into performance specifications and QA/QC procedures for *data suppliers (e.g., the laboratory)* to provide the information needed. This guidance links the results of the DQO Process with the QAPP to complete documentation of the planning process. This guidance discusses the requirement for specifying analytical methods and quality control requirements, such as frequency of instrument calibration, in the QAPP. However, neither this guidance nor other guidance that we found in this review explains how the *data user* is to determine what extent of laboratory QA/QC is necessary.

Suggestion -

The DQO process, or a similar systematic planning process, should be used when planning data collection activities. The Agency should ensure the February 1998 Guidance is disseminated and develop training to assist data users in determining what extent of laboratory QA/QC is necessary and appropriate for the intended use of the data. EPA should require adherence to agreed upon QA/QC procedures; if deviations occur, EPA should take appropriate corrective action.

Assessing the Impact of Laboratory Fraud

Agency efforts to identify the use of and reliance on data produced by the company currently under investigation has proved to be a time consuming and resource intensive process. EPA began its impact assessment shortly after the January 1998 disclosure and to date these efforts are still ongoing. To coordinate the impact analysis, the Office of Enforcement and Compliance Assurance (OECA) has assembled an Agency-wide workgroup with some forty participants representing EPA program offices and regions. EPA staff in headquarters and the regions have been tasked to review each program to identify analytical data generated by this company and to periodically report to OECA the status of their review and findings. In addition, all Agency contractors that have performed work since 1991 have been queried about their reliance on this company for analytical services. Each region has also contacted its states to encourage them to perform their own review of possible use of this company's services.

There are two factors that have caused this impact analysis to be such a resource intensive effort. First, the potential fraud in this case is more pervasive than prior laboratory fraud cases. A number of the Agency's programs were potentially affected by this particular case. In the past, most laboratory fraud cases have been limited to one program; thus, the scope of the impact analysis could be limited to only that program.

Second, the Agency's information about the laboratories that provide analytical services, in many cases, does not appear to be readily available. Many regions have had to resort to file-by-file reviews because there was no database to track information on laboratory data. In some regions this has resulted in the manual review of thousands of files, which has impacted regional resources. For example, one region reported that "these file reviews are extremely labor intensive, taking an average of one hour each." However, there are systems available to track laboratory data that are not being utilized. For example, OSWER maintains the Non-CLP Analytical Tracking System, which is supposed to be used by the regions to track Superfund analytical services not provided by the CLP. Many regions have chosen not to use the system because they find it difficult. Thus, only a few of the regions could take advantage of this system to facilitate their impact assessment.

Well maintained systems have proven very useful in assessing the impact of laboratory fraud. In 1993, after a laboratory fraud case was successfully prosecuted in the GLP program, the Office of Prevention, Pesticide and Toxic Substances (OPPTS), which oversees the GLP program, modified its tracking system to specifically associate data submissions with laboratories and testing facilities that produced the data. As a result, during this impact assessment, OPPTS was able to query the tracking system and quickly identify instances of data generated by the above-mentioned company.

Some EPA regions have recognized the need for such systems. For example, Region 5 has created a computer database from their file review of laboratories and analytical services used by the potentially responsible parties (PRPs) under enforcement lead response actions. "This database will give the [Region 5] Superfund Division a much improved ability to systematically retrieve information on the use of laboratories by PRPs under the program." The Region 6 Superfund Program has approached this problem by managing its files through a document imaging system known as Superfund Document Management System (SDMS). Although SDMS was not created as a result of this laboratory fraud investigation, Region 6 officials said that, if faced with a similar situation, SDMS can be queried for the desired information (i.e., laboratory name). Thus, they could easily identify the relevant files to be reviewed as opposed to having to review all the files.

We believe the Agency could benefit from automated tracking of laboratory information. Not only would automated tracking help facilitate future impact assessments, it should also be useful in overseeing and ensuring the quality of laboratory data provided to the Agency.

Suggestion -

Where information systems currently exist to track laboratory data, the Agency should ensure that the information in these systems is current and complete. In addition, for regions and programs that do not have such systems, the Agency should consider implementing them.

Scope and Methodology

We initiated our review in July 1998. We did not perform an audit of the Agency's controls over laboratory data. Rather, we conducted a review to identify issues that merit further attention by the Agency and/or our office in addressing laboratory fraud. We limited our review and discussion to laboratory fraud. The integrity of data can be impacted throughout sample collection, handling, and analysis. However, we limited this review to laboratory procedures and data review. We assembled numerous QA/QC documents and reviewed the findings and results of prior audits and studies of the issue of laboratory data integrity. In addition, we talked with a number of EPA, industry and other federal agency officials.

Organizations Contacted

During this review, we met with officials from the following organizations:

Environmental Protection Agency, headquarters:

- Office of Administration and Resources Management (OARM);
- Office of Enforcement and Compliance Assurance (OECA);
- Office of Prevention, Pesticides, and Toxic Substances (OPPTS);
- Office of Research and Development (ORD);
- Office of Solid Waste and Emergency Response (OSWER);

Environmental Protection Agency, regional offices:

- Region 3 Office of Analytical Services and Quality Assurance Laboratory;
- Region 6, Program Officials, Dallas, Texas;
- Region 9, Policy and Management Division, Quality Assurance Office;
- Region 10, Quality Assurance and Data Unit.

Department of Health and Human Services

- Office of Research Integrity (ORI), Rockville, Maryland;

Department of Defense

- HQ U.S. Air Force Center for Environmental Excellence, Environmental Quality Directorate;
- U.S. Air Force Center for Environmental Excellence, Consultant Operations Division, Brooks Air Force Base, Texas;
- U.S. Air Force Special Agent, Dallas, Texas;
- U.S. Army Corps of Engineers (USACE), Chemical Data Quality Branch, Omaha, Nebraska;
- U.S. Army Special Agent, Dallas, Texas;

Industry & Trade Associations

- Core Laboratories, Houston, Texas;
- Lancaster Laboratories, Lancaster, Pennsylvania;
- American Council of Independent Laboratories (ACIL), Washington, D.C.

Acronyms

ACIL	American Council of Independent Laboratories
CADRE	Computer Assisted Data Review and Evaluation
CLP	EPA's Contract Laboratory Program
DQO	Data quality objectives
DOD	U.S. Department of Defense
EDD	Electronic Data Deliverable
NELAC	National Environmental Laboratory Accreditation Council
OECA	Office of Enforcement and Compliance Assurance
OPPTS	Office of Prevention, Pesticides, and Toxic Substances
OSWER	Office of Solid Waste and Emergency Response
PBMS	Performance Based Measurement System
PRP	Potentially Responsible Party
QA	Quality assurance
QAPP	Quality assurance project plan
QC	Quality control
RCRA	Resource Conservation and Recovery Act

Prior EPA OIG Audit Coverage

- Review of the Adequacy of Selected Headquarters and Regional Operational Controls over the Contract Laboratory Program, Report No. E1SKE9-11-0047-1100411, September 18, 1991;
- EPA's Procedures to Ensure Quality Data Under the Good Laboratory Practices Program, Report No. E1EPG1-11-0021-1400064, September 30, 1991;
- Alternative for Ensuring Accurate Laboratory Data, Report No. E1EPG1-11-0028-2400032, March 31, 1992;
- Review of the EPA Environmental Monitoring Systems Laboratory (EMSL) QA/QC Control Program for the Superfund Contract Laboratory Program, Report No. E1SKF0-09-0137-2100624 , September 21, 1992;
- Cooperation and Coordination Problems Limit Effectiveness of the Good Laboratory Practices Program, Report No. E1EPF2-11-0041-2100661, September 30, 1992;
- Implementing Controls Would Improve Region 8's Superfund Field Sampling Activities, Report No. E1SKG4-08-0045-5400034, January 27, 1995;
- Environmental Data Quality at DOD Superfund Sites in Region 9, Report No. E1SKF5-09-0031-5100505, September 26, 1995;
- EPA Region 9 Data Quality Oversight at the Aerojet Superfund Site, Report No. E1SKG5-09-0110-6400044, March 28, 1996;
- Laboratory Data Quality at Federal Facility Superfund Sites, Report No. E1SKB6-09-0041-7100132, March 20, 1997;
- Region 8 Needs to Further Strengthen Its Superfund Field Sampling Quality Assurance Controls, Report No. E1SKG7-08-5001-8100082, March 25, 1998;
- Environmental Data Quality at Superfund Removal Actions in Region 9, Report No. E1SFF7-09-0058-8100223, September 4, 1998;
- EPA Had Not Effectively Implemented Its Superfund Quality Assurance Program, Report No. E1SKF7-08-0011-8100240, September 30, 1998.

Reports from Other Organizations

- Overview of EPA's Contract Laboratory Program, General Accounting Office, Report No. GAO/RCED-88-109FS, March 30, 1988;

- Audit of the Department of Energy's Commercial Laboratory Quality Assurance Evaluation Program, Office of the Inspector General for the Department of Energy, Report No. DOE/IG-0374, June 21, 1995;

- Report on Inspection of Analytical Laboratories Oversight at the Strategic Petroleum Reserve, Office of the Inspector General for the Department of Energy, Report No. INS-0D95D02, July 26, 1995.