U.S. DEPARTMENT OF ENERGY

OFFICE OF INSPECTOR GENERAL

REPORT ON INSPECTION OF

ANALYTICAL LABORATORIES OVERSIGHT AT

THE STRATEGIC PETROLEUM RESERVE

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TABLE OF CONTENTS

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WASHINGTON, DC 20585

REPORT ON INSPECTION OF ANALYTICAL LABORATORIES OVERSIGHT AT THE STRATEGIC PETROLEUM RESERVE

I. INTRODUCTION AND PURPOSE

The Department of Energy's (DOE) Assistant Secretary for Fossil Energy has overall programmatic responsibility for the Strategic Petroleum Reserve (SPR). The SPR Project Management Office (SPRPMO), located in New Orleans, Louisiana, and under the direction of the Project Manager, manages day-to-day project activities. The SPR currently has five underground crude oil storage facilities, and one marine terminal, on or near the Gulf Coasts of Texas and Louisiana.

On March 26, 1993, DOE awarded a contract to DynMcDermott Petroleum Operations Company (DynMcDermott) of New Orleans to be the SPR's management and operating (M&O) contractor for a five year period, beginning April 1, 1993. M&O contractor personnel, supported by subcontractors, conduct environmental compliance and oil quality assurance analytical activities at the various SPR facilities.

The purpose of this inspection was to review oversight of M&O and subcontractor laboratories performing analyses on samples taken for SPR environmental compliance and oil quality purposes. During this inspection, the M&O contractor operated on-site environmental laboratories at four of the SPR storage facilities, and oil quality laboratories at two of the facilities. The number of subcontractor laboratories varies depending on the need for analytical support. The objective of this inspection was to determine if the SPRPMO had implemented management systems to provide adequate oversight of M&O contractor analytical laboratory activities, as well as to ensure effective oversight of subcontractor analytical laboratories.

II. SCOPE AND METHODOLOGY

In conducting this inspection, we reviewed pertinent documentation associated with the April 1992 Tiger Team's assessment of the SPR, subsequent Tiger Team analytical laboratory recommendations, and planned corrective actions. Additionally, we interviewed SPRPMO officials responsible for overseeing the implementation of corrective actions for Tiger Team findings, as well as for the ongoing SPRPMO effort to revise the Tiger Team Corrective Action Plan and delete low priority findings. Management systems in place, both within SPRPMO and the M&O contractor, were also reviewed, with emphasis on evaluating the degree of structured oversight provided for analytical laboratory

activities.

To review corrective actions, test the implementation of management systems, and determine the degree of oversight for analytical activities, we visited four SPR storage facilities: the Bayou Choctaw Site, Iberville Parish, Louisiana; the Big Hill Site, Jefferson County, Texas; the Bryan Mound Site, Brazoria County, Texas; and the West Hackberry Site, Cameron Parish, Louisiana. The Quality Assurance/Quality Control (QA/QC) Program Manager, Environmental Restoration Division, Oak Ridge Operations Office, provided technical assistance during inspection activities at these storage facilities.

At each SPR storage facility visited, we discussed analytical activities and laboratory oversight with site environmental, safety, and health (ES&H) management, and with site laboratory and quality assurance personnel. We observed analytical activities within the M&O contractor's four on-site environmental laboratories, and at one of the two oil quality assurance laboratories. We also reviewed documentation related to operation of on-site laboratories, and information pertaining to services performed by analytical subcontractors.

The inspection was conducted in accordance with Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency.

III. SUMMARY RESULTS OF INSPECTION

The following is a brief summary of the findings of this inspection:

o We concluded that the lack of an effective management control system within the SPR M&O contractor resulted in management control deficiencies at SPR analytical laboratories. We identified management control deficiencies which could result in non-compliance with Clean Water Act (CWA) regulations, U.S. Environmental Protection Agency (EPA) guidelines, and DOE orders related to environmental activities and crude oil quality. Boeing Petroleum Services, Inc. (BPS), and DynMcDermott, the successor M&O contractor, had previously been made aware of similar deficiencies, in some cases as early as 1989.

For example, we found that the SPR on-site laboratories conducting environmental compliance and crude oil quality analyses did not have formal laboratory procedures, including quality assurance procedures. Such procedures are required by CWA regulations. As a result of the lack of this basic laboratory control, we observed analytical personnel at one SPR on-site laboratory who were not following proper EPA methods for compliance related analytical processes. We also observed quality assurance problems, including a failure to follow EPA sample chain-of-custody requirements, at

two other SPR on-site laboratories.

We also found that records management requirements had not been defined for SPR's on-site analytical laboratories. As a result, the laboratories recordkeeping practices did not ensure that SPR environmental compliance data would be available to support reports submitted to regulatory agencies. Logbooks containing required original data reports were not being adequately protected through storage in secure, fire-safe cabinets, and duplicate data reports were not being maintained in a separate location.

We further noted that SPR on-site analytical laboratory personnel did not, in all cases, possess required position qualifications nor receive specified continuing training to ensure maintenance of job proficiency. This lack of qualifications and training may have contributed to some of the job performance deficiencies we observed during on-site visits.

o We concluded that the SPRPMO had not provided for oversight, confirmation, and independent verification of work performed by SPR analytical laboratories conducting environmental protection compliance analyses. These requirements are specified in DOE orders, including DOE Order 5400.1, "General Environmental Protection Program." For example, neither SPRPMO Environmental, Safety, and Health officials, SPRPMO Quality Assurance (QA) officials, nor Defense Contract Management Command (DCMC) officials were conducting appraisals of work performed by SPR analytical laboratories for environmental protection compliance. Further, SPRPMO environmental specialists did not agree that they had responsibility for certain assigned oversight functions.

We noted that the 1992 Tiger Team Assessment of the SPR had also identified SPRPMO ES&H oversight deficiencies, including a lack of appraisals. Without adequate oversight of the SPR analytical laboratories, SPRPMO can neither ascertain that an environmental protection program has been effectively implemented, nor determine the degree of SPR compliance with all applicable requirements.

o We concluded that neither DynMcDermott, nor the predecessor contractor, had provided sufficient oversight for on-site and off-site subcontractors providing analytical services. Such oversight is required by DOE orders, including DOE Order 5700.6C, "Quality Assurance." Oversight of subcontractors providing analytical services, to include formal and documented audits, is necessary to ensure that procured services meet established requirements and are of acceptable quality.

We identified problems which may have been prevented by increased M&O contractor oversight of subcontractor

analytical laboratories including: 1) an analytical subcontractor operating on-site at the SPR was unable to, subsequent to our site visit, provide us with data showing the accuracy of a testing device being used; 2) required accuracy and quality control data was missing from data submitted by an SPR subcontract laboratory; 3) quarterly auditing recommended in June 1991 had not occurred at an off-site subcontract laboratory providing oil quality analyses; and, 4) an environmental permit non-compliance was attributed to an off-site analytical subcontractor who had not been subjected to a formal, documented, audit.

- We identified approximately $148,000 of unused laboratory analysis equipment at various SPR site laboratories. We concluded that purchase of a portion of this equipment, approximately $89,000, was an unnecessary expenditure. We subsequently determined that some of the identified equipment had never been used for its intended purpose. Furthermore, all of the equipment had been idle for several years, and had not been promptly excessed nor properly designated as equipment held for future projects, as required by DOE Property Management Regulations.

- Laboratory employees at one SPR site worked around the potential hazards associated with an unneeded radioactive chemical during its long-term storage. A small quantity (approximately 10 grams) of this chemical, Uranyl Acetate, had been stored in an SPR site laboratory for more than 10 years. Current SPR personnel do not know how the radioactive chemical got into the laboratory, or why. DynMcDermott officials we contacted were unable to determine how, when, or why an additional 15 grams of this chemical may have been utilized. Knowledgeable SPRPMO and DynMcDermott officials estimated labor costs ranging between $10,000 and $20,000 had been incurred in repeated attempts to arrange for disposal of the Uranyl Acetate, which had a value of approximately $100. Disposal efforts, and the steadily accumulating disposal costs, were continuing at the conclusion of our inspection field work.

Officials with the Strategic Petroleum Reserve Project Management Office provided comments on the report's findings and recommendations. SPRPMO officials concurred with our recommendations and provided additional comments on actions that have been, or will be, taken with respect to SPR analytical laboratories.

SPRPMO officials stated that significant program improvements had taken place since our inspection was completed. These improvements were based on SPR project initiatives and progress on correcting Tiger Team deficiencies previously identified. Further, the SPRPMO officials stated that DOE and DynMcDermott (DM) now routinely perform oversight of the laboratory function. SPRPMO officials also stated DOE and DM have performed

independent assessments at both contractor off-site and SPR laboratories.

IV. BACKGROUND

The SPR is a large crude oil stockpile with a mission of reducing our nation's vulnerability to supply interruptions by adding, when needed, to U.S. crude oil supplies. Congress authorized the SPR, which is under the control of the President of the United States, in the Energy Policy and Conservation Act of 1975.

The SPR facilities have, since April 1, 1993, been managed and operated by DynMcDermott Petroleum Operations Company under M&O Contract DE-AC96-93P018000. Between April 1, 1985, and March 31, 1993, the management, operating, and maintenance (mOM) contractor at the SPR was Boeing Petroleum Services, Inc. (BPS).

Analysis of SPR environmental samples is required to ensure compliance with environmental regulations, as well as DOE and SPRPMO orders. The analysis of SPR crude oil is part of an overall crude oil quality assurance program which is driven by DOE and SPRPMO orders. This QA program is important to ensure SPR crude oil conforms to its expected characteristics, remains marketable and free of foreign contaminants, and is suitable for normal refinery processing.

At the time of this inspection, the M&O contractor was operating on-site laboratories to analyze samples for environmental compliance purposes at the Bayou Choctaw, Big Hill, Bryan Mound, and West Hackberry sites. Additionally, the M&O contractor was operating on-site laboratories to conduct QA analyses of SPR crude oil at the West Hackberry Site and the St. James Terminal, St. James, Louisiana. The Weeks Island Site, in Iberia Parish, Louisiana, did not have an on-site M&O contractor laboratory in operation during this inspection.

The number of subcontracts in place for analytical laboratory support varies according to the M&O contractor laboratories need for such support. Subcontractor analytical services are typically provided off-site. During our inspection field work, we identified six subcontractor laboratories that were providing some degree of analytical support for the analysis of environmental, crude oil quality, or hazardous waste characterization samples.

Management oversight consists of all those activities which assure and inform management that a program is being effectively implemented. Management oversight is also needed to determine the degree of compliance with applicable requirements. Both DOE and the M&O contractor have issued management oversight guidance.

DOE Guidance

DOE Order 5400.1, "General Environmental Protection Program," dated November 9, 1988, and its subsequent changes, established the DOE policy on management and oversight of environmental activities, such as analysis of environmental samples. DOE's policy is to conduct operations in compliance with the "letter and spirit" of applicable environmental statutes, regulations, and standards. Additionally, DOE is committed to good environmental management and to consistency in meeting environmental obligations. The DOE policy further states that contractors will share the DOE commitment to good environmental management, and that DOE will "actively oversee" contractors' activities to assure compliance.

DOE implementation guidance for management oversight of SPR crude oil analyses is found in Order SPR 5030.1A, "Strategic Petroleum Reserve Crude Oil Quality Assurance Policy," dated April 5, 1985. This Order states the DOE Office of Fossil Energy's policy that the SPR have a comprehensive QA program for crude oil, and defines QA as:

"The planning, systematic management, and auditing of all actions required to ensure the quality of crude oil . . . . Quality assurance encompasses quality control functions as defined below."

Order SPR 5030.1A defines quality control (QC) as:

"All actions involved in the inspection and verification of the characteristics of crude oil . . . . These actions include the sampling, analysis, and data recording and reporting necessary to control the quality of the crude oil."

Contractual Guidance

DynMcDermott is contractually required to utilize the best available management practices, and to comply with applicable DOE orders and guidance. These requirements are found in Section C.1 of the DynMcDermott M&O contract, titled "Scope of Work." Section C.1 requires that DynMcDermott utilize the best available operational technology and "management practices" from Government and commercial sources in the conduct of operations at the SPR. Further, Section C.1 also requires DynMcDermott's compliance with DOE orders, plans and programs, and management directives for M&O contractors.

V. RESULTS OF INSPECTION

DYNMCDERMOTT'S MANAGEMENT CONTROL SYSTEM FOR SPR ANALYTICAL LABORATORIES

Both the DynMcDermott contract, and the former BPS

contract, contain requirements for compliance with Clean Water Act regulations and guidelines. Adequate analytical laboratory controls are required for compliance with CWA regulations. EPA enforces these regulations and other guidelines. The need for effective management control systems for SPR analytical laboratories is also affirmed in DOE orders which provide policies and guidance on environmental activities and crude oil quality.

We concluded that the lack of an effective management control system within the SPR M&O contractor resulted in management control deficiencies at SPR analytical laboratories. We identified management control deficiencies which could result in non-compliance with Clean Water Act regulations, U.S. Environmental Protection Agency guidelines, and DOE orders related to environmental activities and crude oil quality. BPS, and/or DynMcDermott, the successor M&O contractor, had previously been made aware of similar deficiencies, in some cases as early as 1989.

For example, we found that the SPR on-site laboratories conducting environmental compliance and crude oil quality analyses did not have formal laboratory procedures, including quality assurance procedures. Such procedures are required by CWA regulations. As a result of the lack of this basic laboratory control, we observed analytical personnel at one SPR on-site laboratory who were not following proper EPA methods for compliance related analytical processes. We also observed quality assurance problems, including a failure to follow EPA sample chain-of-custody requirements, at two other SPR on-site laboratories.

We also found that records management requirements had not been defined for SPR's on-site analytical laboratories. As a result, the laboratories recordkeeping practices did not ensure that SPR environmental compliance data would be available to support reports submitted to regulatory agencies. Logbooks containing required original data reports were not being adequately protected through storage in secure, fire-safe cabinets, and duplicate data reports were not being maintained in a separate location. We further noted that SPR on-site analytical laboratory personnel did not, in all cases, possess required position qualifications nor receive specified continuing training to ensure maintenance of job proficiency. This lack of qualifications and training may have contributed to some of the job performance deficiencies we observed during on-site visits.

SPR Laboratory Procedures

We found that, despite a long recognized need, SPR on-site laboratories conducting oil quality and environmental compliance analyses did not have formal laboratory procedures, a necessary laboratory control. The

laboratories also did not have quality assurance procedures. Adequate laboratory controls and quality assurance procedures are required by CWA regulations.

Laboratory Procedure Requirements

The primary environmental regulations which SPR sites must comply with are CWA permit regulations in Title 40, Code of Federal Regulations (CFR), Part 122, "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System" (NPDES). These regulations contain permit requirements for any discharge of pollutants to surface waters. NPDES permits are held by the SPR sites and contain provisions for compliance sampling, analysis, and reporting. In complying with these permits, 40 CFR 122.41(e), "Proper operation and maintenance," states:

"The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures."

These provisions are incorporated into SPR permits issued by the EPA, and into SPR permits issued under some state programs. Additionally, some SPR permits modify the above provisions to include, along with adequate laboratory controls, adequate "process controls." By specific incorporation of Federal Acquisition Regulation 52.223-2, "Clean Air and Water" (APR 1984), into the BPS contract (DE-AC96-85P021431), and subsequently into the DynMcDermott contract (DE-AC96-93P018000), both contractors agreed to comply with all CWA regulations and guidelines.

Additionally, work process controls, including procedures, are specifically required by DOE Orders 5400.1, "General Environmental Protection Program," and 5700.6C, "Quality Assurance." Also, DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities," sets forth DOE's policy that procedures be used to control conduct of operations, reviews, and assessment of program effectiveness.

Previous Reviews at SPR Laboratories

During our inspection, we identified a number of previous reviews that identified problems related to the lack of laboratory standard operating procedures. We also noted that BPS was made aware of laboratory procedural problems as early as August 1989, when the SPRPMO Site Appraisal Report on the now decommissioned Sulphur Mines SPR Site was issued. This report mentioned a Headquarters Survey Appraisal that had identified a lack of written laboratory

procedures for water quality samples. Drafting of these procedures had not been completed at the conclusion of our inspection field work, even though permits containing the need for such procedures were issued to SPR sites as early as 1982.

In May 1991, an analytical laboratory audit was performed by DOE's Oak Ridge Operations Office (ORO). At that time, the SPRPMO Project Manager reported to the ORO Manager. This relationship has since changed, with the SPRPMO Project Manager now reporting to DOE Headquarters. The May 1991 audit, transmitted to the SPRPMO Project Manager on June 5, 1991, identified laboratory procedural problems at the various SPR sites.

During March and April 1992, the Tiger Team Assessment of the SPR was conducted. The Tiger Team found a lack of approved laboratory procedures adequate to control sampling and analysis, calibration and standardization, documentation and reporting, data validation, outside services, and auditing. Included in the Tiger Team's findings was the lack of an environmental QA program, including QA/QC plans and procedures.

Since 1989, numerous other reviews of BPS and DynMcDermott activities have documented problems with the preparation of laboratory procedures. These reviews have stressed the preparation of a procedural document, referred to by reviewers and analytical staff as the "Laboratory Programs and Procedures Manual" (LPPM). Synopses of the additional reviews we analyzed is provided in Appendix A.

On September 28, 1993, DynMcDermott issued an Environmental Programs and Procedures (EPPM) document. This document, which did not contain laboratory procedures, refers the reader to the LPPM for guidance on sampling and analysis procedures, data management, instrument operation, laboratory QA, and contract laboratory services. The EPPM also shows a document control number for the LPPM, as if the LPPM was at that time a completed document. However, as previously stated, the LPPM had yet to be issued at the completion of our inspection field work in July 1994.

Procedures Not High Priority

In April 1991, BPS created and filled a position to manage the majority of SPR analytical activities. The duties of this manager included writing the LPPM, a task which remained incomplete when the BPS contract expired. The employee who filled this management position told us BPS officials had discussed the need for formal laboratory procedures as early as January 1990.

This employee, who continued to be responsible for writing the LPPM under DynMcDermott, told us that not more than five days in a row was ever spent working on the LPPM. Other initiatives were deemed to be of a higher priority. This employee also told us DynMcDermott management had not

made LPPM completion a priority, and that management had repeatedly said they would arrange for extensions of LPPM due dates.

However, this employee's current supervisor told us the task of writing the LPPM was indeed a high priority. Further, this employee's former supervisor told us, "I probably should have stepped in to do something" to speed up the LPPM.

A SPRPMO ES&H Division official told us one reason the SPR lacked a LPPM could be attributed to a lack of SPRPMO ES&H oversight. The SPRPMO ES&H official also said that M&O contractor oversight weaknesses were another reason the LPPM had never been completed. This official concluded "we have both [SPRPMO and the M&O contractor] fallen down" on responsibilities for timely issuance of the LPPM.

Problems Resulting from Lack of Procedures

During our review, a SPRPMO division director told us the lack of a LPPM created problems for SPR sampling and laboratory consistency, and that such a document was needed to satisfy the QA program requirements found in DOE Order 5400.1. Further, DynMcDermott officials told us that, without the LPPM, there were neither procedures or formal guidance for sampling and analysis activities, nor for proper laboratory auditing and control.

Management officials in the DynMcDermott Quality Assurance organization stated that their personnel were conducting ES&H oversight activities at the SPR sites. These activities consist of ES&H checklist audits, called "surveillances." We reviewed the DynMcDermott QA checklists, and determined that sampling and analytical processes were not included. DynMcDermott QA personnel at the sites confirmed this, and explained that since the LPPM had not been published, they had not conducted oversight of laboratory processes.

During site inspections, we observed DynMcDermott laboratory personnel following informal procedures, which they called "cheat sheets," when performing laboratory analyses. We also observed consistency/QA problems, including two on-site laboratories not following EPA sample chain-of-custody requirements, thereby reducing legal defensibility of the resulting analytical data. At another SPR on-site laboratory, we observed staff who were not following the proper EPA methods for three different compliance related analytical processes (Biochemical Oxygen Demand analysis, Total Organic Carbon analysis, and pH meter calibration).

SPR Laboratory Recordkeeping

We concluded that recordkeeping practices at SPR on-site analytical laboratories may not ensure that important environmental compliance data is protected against damage

or loss.

Records Management Requirements

As stated above, NPDES Permits are held by the SPR sites. These permits contain provisions for compliance sampling, analysis, and reporting. The reports prepared under NPDES Permits, known as Discharge Monitoring Reports (DMRs), reflect the results of analyses performed by SPR and subcontractor analytical laboratory personnel. With respect to recordkeeping related to these analyses and the resultant DMRs, 40 CFR 122.41(j)(2-3), "Monitoring and records," states:

". . . the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application."

The referenced portion of 40 CFR continues by including information which would typically be entered in laboratory logbooks (i.e., dates/times/place of sampling/analysis, names of samplers/analysts, and analytical methods). Also included are requirements relating to results of analyses (original data when no duplicates exist). These recordkeeping requirements are incorporated into SPR NPDES Permits, and permits issued to SPR sites by state regulatory agencies.

DOE Orders 5400.1, "General Environmental Protection Program," and 5700.6C, "Quality Assurance," contain criteria pertaining to records. Also, Order SPR 5030.1A, "Strategic Petroleum Reserve Crude Oil Quality Assurance Policy," makes "sampling, analysis, and data recording and reporting" a part of the crude oil QA program.

Records Management Requirements Not Defined

Our review revealed that records management requirements had not been defined, nor implemented via SPR laboratory procedures. As a result, laboratory recordkeeping practices did not ensure SPR environmental compliance data would be available to support reports submitted to regulatory agencies.

During the Tiger Team Assessment of the SPR in 1992, BPS was made aware of records management program deficiencies. The Tiger Team found a general lack of implementation of DOE policies for the protection and control of analytical

records, while noting inadequacies at all SPR site laboratories. The Tiger Team's report mentioned specific instances of inadequacies related to the protection and preservation of analytical records, including compliance records.

On August 16, 1993, DynMcDermott prepared corrective action plans (CAPs) for the Tiger Team's records management findings. These plans indicated that recordkeeping procedures were to be included in the Environmental Programs and Procedures Manual, and the Laboratory Programs and Procedures Manual. The recordkeeping requirements were to be defined by March 30, 1994, with transfer of appropriate records to fire-safe cabinets by February 28, 1995.

On September 28, 1993, two related actions occurred: 1) DynMcDermott issued an EPPM which specified retention of certain categories of environmental records for three years, but which did not contain specific records management procedures nor specifically address laboratory records; and 2) DynMcDermott revised and consolidated the CAPs for the above mentioned records management findings. The EPPM referred the reader to the then nonexistent LPPM for details on data management, and the consolidated CAP indicated that DynMcDermott planned to postpone defining recordkeeping requirements until April 1996, with transfer of records in June 1996. A DOE Oversight Designee approved this revision and consolidation.

Compliance Protocol Did Not Include EPA Requirements

Corrective action plans resulting from the Tiger Team assessment were being revised at the conclusion of our inspection field work. The Tiger Team's findings were being evaluated by M&O contractor personnel, with SPRPMO personnel approving the contractor's evaluations. These evaluations compared the Tiger Team compliance protocol (i.e., laws, DOE orders, and best management practices) with the potential ES&H impact of the findings. The findings were being assigned corrective action priorities based on the evaluators' judgement of whether the finding identified major or marginal ES&H non-compliance. This prioritization was also impacted by whether the ES&H non-compliance was with Federal, state, or local laws, DOE ES&H orders, or best management practices.

When reviewing SPR's laboratory records management practices, the Tiger Team did not utilize a compliance protocol which included EPA requirements for the retention of records. Because the compliance protocol only included DOE orders significant to ES&H, the sampling, analysis, and data recording and reporting section of the SPR crude oil QA Order, Order SPR 5030.1A, was not included. Since the compliance protocol neither included EPA requirements, nor non-ES&H criteria such as Order SPR 5030.1A, corrective actions for the Tiger Team's records management findings

may not have been assigned sufficient priority in initial CAPs, or in subsequent revisions.

Recordkeeping Problems Noted

We observed several recordkeeping problems during our site inspections. For example, chemists at the SPR on-site laboratories we visited used their own informal recordkeeping systems, without a consistent approach and without written indexing procedures. Due to this informality, chain-of-custody records for samples analyzed, as well as analysis reports from subcontractor laboratories supporting the on-site laboratories, were loosely stored in folders and were not consistently organized in a logical manner. We were unable to review a specific chain-of-custody record at one laboratory because the record could not be located.

Logbooks containing original data reports were stored in laboratory cabinets. The cabinets used were not secure, fire-safe cabinets, and, as such, would not adequately protect these original laboratory records from fire or other loss. Therefore, compliance with the requirement in 40 CFR 122.41(j)(2) to maintain analytical data for three years could be jeopardized, since duplicate required data was not being maintained at another location.

We also observed, during the site inspections, various planned or ongoing construction efforts to increase SPR's capability to perform crude oil QA analyses on-site. As a result of performing more analyses on-site, additional data will need to be maintained at the sites. Therefore, inadequate recordkeeping practices could result in significant losses of data required for compliance with the SPR crude oil QA Order.

SPR Analytical Personnel Qualifications/Training

We found that SPR on-site analytical laboratory personnel did not, in all cases, possess required qualifications nor receive continuing training to ensure maintenance of job proficiency.

Qualifications/Training Requirements

As stated in a previous section, the SPR sites hold EPA and state permits. Certain of these permits stipulate that proper operation and maintenance of permitted facilities includes "adequate operator staffing and training."

DOE Order 5700.6C, "Quality Assurance," also requires continuing training to ensure maintenance of job proficiency. This Order also requires that the training provided emphasize correct performance of work.

At the M&O contractor level, the DynMcDermott "Laboratory

Management Plan," dated November 1993, specifies qualifications for analytical personnel. This Plan requires safety, sampling, and analysis training for new laboratory employees. The Plan also requires annual

"Refresher courses and update sessions and training . . . ."

SPR Analytical Personnel - Site Chemists

In some cases, SPR site chemists contacted during inspection site visits had not received continuing training to ensure maintenance of job proficiency nor to ensure correct performance of work. At one SPR site, the site chemist said that he had not received any analytical procedures training since he was employed as a SPR site chemist in 1991.

At another SPR analytical laboratory, the site chemist performed regulatory and oil quality analyses. This chemist told us he had only been to one analytical procedures training class since becoming an SPR laboratory employee in 1987. This class, which covered only one of many possible analytical procedures (i.e., five day Biochemical Oxygen Demand, BODs), was provided two years ago. This same site chemist, although responsible for the analysis of site wastewater, had not attended a wastewater analysis course.

SPR Laboratory Technician

During an inspection site visit at a SPR analytical laboratory, we found that the laboratory technician did not meet specified qualification requirements. As previously noted, Section 2.3 of the M&O contractor's "Laboratory Management Plan" contains the functions, responsibilities, and qualifications of SPR site laboratory technicians. In part, this section states:

"2.3.3 Qualifications

a. Possess an associate of science degree in chemistry or a related field.

b. Have at least 1 year of experience in crude oil, wastewater analysis, or both."

Contrary to the above guidance, the laboratory technician's supervisors told us the technician did not have prior analytical laboratory or chemistry experience. These supervisors further advised that the laboratory technician's prior SPR job assignment had been that of a stock clerk. A DynMcDermott human resources official also confirmed that the laboratory technician did not possess the specified associate of science degree.

Other Problems Attributed to a Lack of Training

As discussed earlier in this report, we noted job

performance deficiencies, including problems related to consistency/QA, chain-of-custody, and analytical processes. These deficiencies may have been minimized if more emphasis was placed on continuing training, as required by DOE Order 5700.6C.

Conclusion

We concluded that the lack of an effective management control system within the SPR M&O contractor resulted in management control deficiencies at SPR laboratories. We identified management control deficiencies which could result in non-compliance with Clean Water Act regulations, EPA guidelines, and DOE orders related to environmental activities and crude oil quality. BPS, and DynMcDermott, the successor M&O contractor, had previously been made aware of problems in these areas; the procedural problems were identified as early as 1989.

For example, we found that SPR on-site laboratories conducting environmental compliance and oil quality analyses did not have formal laboratory procedures, including quality assurance procedures. Such procedures are required by CWA regulations. We also found that recordkeeping practices at SPR analytical laboratories did not ensure that environmental compliance data would be available to support reports to regulatory agencies. We further noted that SPR on-site analytical personnel did not, in all cases, possess required qualifications nor receive specified continuing training to ensure maintenance of job proficiency.

Recommendation

We recommend that the Manager, Strategic Petroleum Reserve Project Management Office:

1. Direct DynMcDermott to review their management control system for SPR analytical laboratories, and to take necessary and timely actions to strengthen identified deficiencies, including those discussed in this report.

Strategic Petroleum Reserve Project Management Office officials concurred with Recommendation 1. The SPRPMO officials stated "The Laboratory Program and Procedures Manual was formally published in May 1994 but lacked details in several areas." However, the SPRPMO officials noted that the specific concerns expressed by the inspection team concerning environmental compliance were incorporated into the May 1994 publication. SPRPMO officials stated that "All [LPPM] actions are scheduled to be completed by July 31, 1995."

Regarding records management, SPRPMO officials stated that "The existing Laboratory Program and Procedures Manual, Section 7, provides clear instructions on proper logbook

maintenance, and indicates that each piece of test equipment will have a separate logbook. Duplicate information is maintained in New Orleans, Crude Oil and Quality Control for Crude Oil samples and Environmental, Safety and Health for environmental permit requirements. The logbooks are maintained in accordance with the Conduct of Operations procedures. The new secure, fire-safe, filing cabinets have been installed in the five laboratories and the records have been transferred." SPRPMO officials further stated an environmental chain-of-custody procedure had been published, a crude oil sample custody procedure had been revised, and that SPR laboratories were complying with these procedures.

SPRPMO officials further stated, regarding training, that "The laboratory technician at West Hackberry is the only technician without a formal technical degree. This technician has attended off-site courses including advanced laboratory training and on-the-job training from the laboratory chemist. The technician has been in the position for 1 year and has shown proficiency to perform the required laboratory tests and tasks." SPRPMO officials further stated that site chemists had attended off-site training (analytical methods, safety, laboratory auditing) and "A performance-based training program for the laboratory chemists and technicians is in the rough stages of development. This item remains open until the training program is implemented, scheduled for June 30, 1995."

SPRPMO OVERSIGHT OF ANALYTICAL LABORATORIES

We concluded that SPRPMO had not provided for oversight, confirmation, and independent verification of the work performed by SPR analytical laboratories conducting environmental protection compliance analyses. These requirements are specified in DOE orders, including DOE Order 5400.1. We noted that the 1992 Tiger Team Assessment of the SPR had also identified SPRPMO ES&H oversight deficiencies, including a lack of appraisals. Without adequate oversight of the SPR analytical laboratories, SPRPMO can neither ascertain that an environmental protection program has been effectively implemented, nor determine the degree of SPR compliance with all applicable requirements.

Requirements for SPRPMO Oversight

DOE Order 5400.1, "General Environmental Protection Program," dated November 9, 1988, and subsequent changes, requires DOE Heads of Field Organizations to develop and implement programs that direct contractors to execute environmental protection compliance programs and policies. This Order also requires Heads of Field Organizations to provide for oversight, confirmation, and independent verification of these contractor programs. Additionally, DOE Order 5700.6C, "Quality Assurance," requires that planned, periodic independent assessments be established

and implemented by an independent assessment organization. One purpose of such assessments is to improve processes by emphasizing the achievement of quality.

Oversight by SPRPMO's ES&H Division Not Occurring

During the Tiger Team's 1992 Assessment of the SPR, they found deficiencies in SPRPMO's ES&H oversight activities, including the lack of QA appraisals in the ES&H area. Nonetheless, DynMcDermott ES&H management officials told us, and SPRPMO ES&H officials confirmed, that no SPRPMO appraisals addressing regulatory analyses have occurred since before the Tiger Team review of 1992.

During our review, SPRPMO's ES&H Division Director told us that two environmental specialists in that Division had responsibility for oversight of any SPR laboratory analytical determinations required by NPDES and other regulations. Neither environmental specialist agreed that they had these responsibilities. When questioned further, the Division Director told us the environmental specialists may not have been told as specifically as they should have been about their oversight duties, and they may not have understood that an entire oversight program had to be planned and scheduled.

As discussed in more detail later in this report, oversight of analytical subcontractors by the M&O contractor, in the form of formal and documented appraisals, was also not occurring. We noted that SPRPMO ES&H Division officials were under the impression that such appraisals were occurring.

Environmental Oversight by SPRPMO's QA Division Not Occurring

The 1992 Tiger Team, noting a deficiency related to independent assessments, stated that "The SPRPMO Quality Assurance Division does not include environmental quality assurance activities in the scope of the QA audits performed at SPR sites . . . ." Subsequently, SPRPMO Quality Assurance Procedure (QAP) 10.3, "INDEPENDENT ASSESSMENT AND OVERSIGHT OF ES&H," was issued with an effective date of January 6, 1993. This procedure established a system for SPRPMO's QA Division to conduct independent assessments and oversight of ES&H functions and activities. QAP 10.3 includes environmental protection activities, such as compliance analyses by laboratories, in the definition of ES&H functions and activities. Further, QAP 10.3 states that QA oversight of ES&H occurs primarily through assessments/verifications, performed jointly with, or separately from, other SPRPMO elements.

We observed that SPRPMO's QA Division was performing periodic independent assessments of safety and health. However, we noted that this Division was not planning, nor performing, periodic independent assessments and oversight

of environmental protection activities, including analytical laboratories' environmental compliance and QA activities. Divisional officials advised that they were waiting to conduct such assessments in conjunction with SPRPMO's environmental specialists.

ES&H Oversight by DCMC Not Occurring

The Defense Contract Management Command, an agency of the U.S. Department of Defense, provides quality assurance support to the SPR relative to goods and services, under an interagency agreement. This support includes SPR site maintenance and operation, and crude oil quality and quantity verification. For specifically designated DOE material and equipment, DCMC performs source inspection and production surveillance in contractors' plants and at SPR sites. DCMC also performs pre-award surveys, property administration support, and quality and administrative services, as delegated by SPRPMO.

In November 1992, as part of the corrective action for a Tiger Team finding regarding quality verification, SPRPMO requested that DCMC provide ES&H oversight support to supplement SPRPMO's oversight. In January 1993, DCMC responded to the SPRPMO request with a schedule indicating ES&H QA oversight would begin with audits during that same month.

Interviews with DCMC QA representatives stationed at SPR sites revealed that, contrary to understandings between SPRPMO and DCMC, ES&H audits (including ES&H audits of SPR analytical laboratories) had not occurred. DCMC management told us that the schedule provided to SPRPMO in January 1993 was tentative, and not binding. DCMC officials also told us this oversight had not been initiated due to a lack of necessary oversight training.

Conclusion

Although more than two years had elapsed since the Tiger Team identified SPRPMO ES&H oversight deficiencies, we found that SPRPMO had not begun to implement related requirements of DOE Orders 5400.1 and 5700.6C. We therefore concluded that neither oversight, confirmation, nor independent verification of work performed by SPR analytical laboratories conducting environmental protection compliance analyses was occurring.

Without adequate oversight of the SPR analytical laboratories, SPRPMO can neither ascertain that an environmental protection program has been effectively implemented, nor determine the degree of SPR compliance with all applicable requirements.

Recommendation

We recommend that the Manager, Strategic Petroleum Reserve

Project Management Office:

2. Implement oversight, confirmation, and independent verification activities, as required by DOE Orders 5400.1 and 5700.6C, for work performed by SPR analytical laboratories performing environmental protection compliance analyses.

Strategic Petroleum Reserve Office Project Management Office officials concurred with Recommendation 2. SPRPMO officials stated that results of blind sample tests conducted as part of the EPA Discharge Monitoring Report Quality Assurance Program have consistently verified SPR laboratory data's accuracy.

SPRPMO officials further stated that "In February and March of 1994, DOE and DM QA organizations jointly developed an award fee goal for providing oversight of DM ES&H activities; included in the implementation of this goal was the independent assessment by DM Quality Assurance of crude oil and environmental functions performed by SPR in-house and contracted laboratories. . . . DOE, Quality Assurance Division accompanied the DM assessment group on a number of on-site and off-site laboratory visits, and developed a written evaluation of its activities; findings and conclusions of this evaluation were included in an audit report forwarded to DM Quality Assurance in October 1994."

SPRPMO officials also stated that DCMC had also been active in the oversight of crude oil laboratories under the DOE contract. In addition, SPRPMO officials stated that laboratory oversight was planned during a number of site reviews, concluding with Bayou Choctaw on September 22, 1995. Concerning these reviews, SPRPMO officials stated "This item will be considered closed with the completion of the last site review at Bayou Choctaw."

ANALYTICAL SUBCONTRACTOR OVERSIGHT

We concluded that neither DynMcDermott, nor the predecessor contractor, had provided sufficient oversight for on-site and off-site subcontractors providing analytical services. Such oversight is required by DOE orders, including DOE Order 5700.6C, "Quality Assurance." Oversight of subcontractors providing analytical services, to include formal and documented audits, is necessary to ensure that procured services meet established requirements and are of acceptable quality.

We identified problems which may have been prevented by increased M&O contractor oversight of subcontractor analytical laboratories including: 1) an analytical subcontractor operating on-site at the SPR was unable to, subsequent to our site visit, provide us with data showing the accuracy of a testing device being used; 2) required accuracy and quality control data was missing from data

submitted by an SPR subcontract laboratory; 3) quarterly auditing recommended in June 1991 had not occurred at an off-site subcontract laboratory providing oil quality analyses; and, 4) an environmental permit non-compliance was attributed to an off-site analytical subcontractor who had not been subjected to a formal, documented, audit.

Oversight Requirements

DOE orders require auditing of suppliers' performance, effectiveness, and quality. Suppliers include subcontractors who provide goods or services. For example, DOE Order 5700.6C, "Quality Assurance," requires performance evaluation using a "rigorous" assessment process. Further, this Order requires organizations to ensure procured services meet established requirements and to verify that approved suppliers can continue to provide acceptable services.

Contractors Were Made Aware of Need for Oversight

A need for analytical subcontractor oversight was conveyed to BPS in 1991 and 1992. DynMcDermott, as the successor contractor, inherited the responsibility for correcting these oversight inadequacies.

At the request of the SPRPMO ES&H Division Director, an analytical laboratory audit was performed by the Oak Ridge Operations Office in May 1991. The results of this audit were transmitted to the SPRPMO Project Manager on June 5, 1991. ORO determined that oversight of subcontractors providing analytical services was inadequate to assure that SPR's required accuracy and precision levels were being satisfied. For example, SPR sites did not have formal audit programs for reviewing subcontract laboratories used to conduct routine sample analyses. Further, data received from contract laboratories was not subjected to a formal data review and validation program. As a result, subcontractor data, from samples which had exceeded EPA holding times, was being used without being so noted. The May 1991 ORO report suggested several ways to improve oversight activities.

The Tiger Team's Assessment of the SPR, issued in April 1992, also identified deficiencies related to oversight of analytical subcontractors.

Analytical Subcontractor Oversight is Not Occurring

DynMcDermott laboratory and ES&H officials, who were also formerly with BPS, were unaware of any formal, documented, BPS or DynMcDermott audits of analytical subcontractors, including those subcontractors performing waste characterization analyses for SPR compliance with Federal and state hazardous waste regulations. The former BPS

Environmental Manager told us that oversight of analytical subcontractors had been "less than adequate." The DynMcDermott official tasked with laboratory oversight told us that, under DynMcDermott, a program did not exist to approve suppliers of analytical services, to appraise analytical subcontractor performance, nor to provide documented audit records for quality purposes.

On September 28, 1993, DynMcDermott issued an Environmental Programs and Procedures document. This document did not contain guidance for oversight of DynMcDermott subcontractor laboratories. Rather, the EPPM referred the reader to a nonexistent Laboratory Programs and Procedures Manual for guidance on contract laboratory services. The EPPM showed a document control number for the LPPM, as if the LPPM was a completed document. However, at the conclusion of our inspection field work, the LPPM had not been issued in draft or final form.

Analytical Subcontractor Problems Identified

We identified problems related to analytical subcontractors during our review. A discussion of these subcontractor problems follows.

Analytical Subcontractor Staff Could Not Provide Data

DOE has been studying a problem associated with the SPR's storage of crude oil. This problem deals with a higher-than-normal gas content in some crude oil, apparently from years of intrusion of methane from the surrounding salt formations. The presence of the methane may require additional equipment and changes in certain operational configurations to ensure that the SPR can deliver crude oil of the proper specifications for commercial transportation and refining.

During our visit to the Bryan Mound Site, we observed a subcontractor using a gas chromatograph analyzer to evaluate the methane content of oil stored in the Bryan Mound underground storage caverns. The subcontractor stated that they were operating in accordance with the Standard Practice Procedures developed by the Gas Processors Association. These procedures indicate that the linearity, or accuracy, of a gas chromatograph analyzer must be established prior to carrying out an analytical procedure. This is done by charging the gas chromatograph with varying quantities (i.e., partial pressures) of pure component standard and plotting this against the instrument response.

Based on a review of instrument operation logs for the gas chromatograph analyzer, and discussions with the subcontractor's staff, we determined that the instrument had not been properly calibrated. The subcontractor's staff also could not provide us with linearity check data for the analyzer being used, and, therefore, could not demonstrate that the instrument's response was linear (i.e., accurate)

in the range of actual observed gas concentrations.

Lab Data Not Checked for Contract Compliance

Laboratory data generated by subcontractor laboratories was not consistently checked by M&O contractor laboratory staff for contract compliance, nor always subjected to a documented review. For example, we observed metals analysis data packages at the Bryan Mound Site laboratory which did not contain calibration curve verification data. The verification data demonstrates the accuracy of the analytical results, which are used for the NPDES Permit compliance program.

Another data package was missing quality control sample results. The contract between DynMcDermott and the subcontractor laboratory specifically required that the verification data and quality control sample results be provided. Bryan Mound's laboratory staff was unaware, until our inspection site visit, that the above described data was missing.

Subsequently, Bryan Mound laboratory staff visited the subcontractor in question and observed several discrepancies. These discrepancies included confirming that calibration curve verification data had not been provided. Bryan Mound staff also noted a lack of evidence that the subcontractor had standardized its prepared reagents (substances used in chemical reactions to detect, measure, or produce other substances) as per EPA methodology.

Recommended Audits Not Performed at Oil Quality Laboratory

SPRPMO Order 5030.1B, "Strategic Petroleum Reserve Crude Oil Quality Program and Test Criteria," dated January 24, 1991, requires the M&O contractor to implement a Crude Oil Quality Control Program. In part, this program requires measures to control the quality of the crude oil. The M&O contractor is also required to maintain detailed records of actions accomplished in the execution of the program, and the results of these actions.

For several years, a subcontractor has been utilized for certain SPR crude oil quality tests. The tests performed by this subcontractor include Inductivity Coupled Plasma Spectroscopy for trace elements in oil, and Graphite Furnace Atomic Absorption Spectrophotometry for low level elemental analysis of oil.

Our review of records pertaining to this subcontract showed that a Preaward Technical Survey was conducted on June 4, 1991. At that time, the proposed subcontractor was performing predominantly water and hazardous waste analyses, rather than petroleum analyses which would be required by the subcontract. During this survey, the evaluator was

unable to verify that the proposed subcontractor possessed any of the required test equipment. The evaluator also determined that the proposed subcontractor's staff needed to refamiliarize themselves with testing procedures.

In the June 1991 Preaward Technical Survey Report, the evaluator recommended the evaluated company be selected by BPS to fulfill the contract. However, the Report stated the evaluator wanted to return for another inspection when the subcontractor achieved compliance and also that ". . . regular auditing will be done on a quarterly basis."

Although the subcontractor in question was still conducting crude oil analyses for DynMcDermott at the close of our inspection field work, neither the recommended follow-up assessment nor any of the quarterly audits had ever been carried out. The BPS employee who had been responsible for oversight of this subcontract has also been responsible for its oversight as a DynMcDermott employee. This employee stated an informal visit had been made to the subcontractor on one occasion. However, neither this employee, nor any other DynMcDermott crude oil control or laboratory official contacted, could furnish a record documenting their oversight activities of this subcontractor (as required by SPRPMO Order 5030.1B).

Noncompliance With Permit Blamed on Analytical Subcontractor

In order to comply with the NPDES Permit, two stormwater samples were taken at the Big Hill Site on January 7, 1993. That same day, these two samples were shipped to an analytical subcontractor for analysis of oil and grease as required by the NPDES permit.

On January 11, 1993, the original sample results, which indicated noncompliant values for both samples, were received at Big Hill. Upon query by site personnel, the subcontractor explained that, due to data transposition, the value of one sample was erroneous. However, the noncompliant result of the second sample was correct.

An occurrence report filed by the Big Hill Site attributed the permit noncompliance on contaminated labware used by the subcontract analytical laboratory. A SPRPMO review of this occurrence raised several questions, including a question about oversight of the analytical subcontractor's facility. SPRPMO's Assistant Project Manager for Technical Assurance transmitted the questions to BPS in late March 1993.

One of the questions SPRPMO transmitted dealt with the MOM contractor's plan for evaluations of the analytical subcontractor. Regarding this question, SPRPMO wrote "If the suspected cause for sample test failure is dirty laboratory glassware, it appears prudent for BPS to visit the laboratory and evaluate laboratory cleanliness standards

to preclude future incidents." DynMcDermott responded to the questions on April 20, 1993, after replacing BPS and becoming the SPR M&O contractor. The DynMcDermott response to the above question and associated statement read:

"The laboratory in question was inspected by the Analytical Programs Manager in mid-1991 when the laboratory was Source One, Inc. It is now under new management. It is the management and operating contractor's intent to inspect commercial laboratory facilities on at least an annual basis, subject to resource availability. The purchase contracts include the clause allowing the technical representative or their designee to visit the laboratory at any time."

When questioned about this response, the former BPS Analytical Programs Manager (still employed at the conclusion of our inspection field work as a DynMcDermott laboratory official) told us that his inspection was really a "friendly visit" to the predecessor company.

We determined that the subcontracted laboratory was not again visited until September 22, 1993, more than eight months after the permit noncompliance discussed above. While the visiting SPR site chemist prepared a memo which documented the visit, the memo did not contain the objective and scope of the visit, nor any findings or concerns about the acceptability of the supplied services. Further, the SPR site chemist characterized the visit to us as an informal visit to the subcontractor's facilities. Therefore, the visit, in our view, could not be classified as an audit since established audit requirements were not followed.

Conclusion

We concluded that neither DynMcDermott, nor the predecessor contractor, had provided sufficient oversight for on-site and off-site subcontractors providing analytical services. Such oversight is required by DOE orders, including DOE Order 5700.6C, "Quality Assurance." Oversight of subcontractors providing analytical services, to include formal and documented audits, is necessary to ensure that procured services meet established requirements and are of acceptable quality.

Recommendation

We recommend that the Manager, Strategic Petroleum Reserve Project Management Office, direct DynMcDermott to:

3. Implement subcontractor analytical laboratory oversight, as required by DOE Order 5700.6C, that is sufficient to ensure procured analytical services meet established requirements and to verify that approved suppliers can continue to provide acceptable services.

Strategic Petroleum Reserve Project Management Office officials concurred with Recommendation 3. SPRPMO officials stated that "DM has instituted a contractor laboratory oversight program for crude oil and environmental laboratories. This program entails pre-award surveys and periodic follow-up audits. Seven oil laboratories and 15 Environmental laboratories inspections were conducted during Fiscal Year 1994. This item is considered closed."

MANAGEMENT PRACTICES FOR SELECTED EQUIPMENT AT SPR SITE LABORATORIES

We identified approximately $148,000 of unused laboratory analysis equipment at various SPR site laboratories. We concluded that purchase of a portion of this equipment, approximately $89,000, was an unnecessary expenditure. We subsequently determined that some of the identified equipment had never been used for its intended purpose. Furthermore, all of the equipment had been idle for several years, and had not been promptly excessed nor properly designated as equipment held for future projects, as required by DOE Property Management Regulations.

Requirements for Management of Laboratory Equipment

Section C.1 of the M&O contract with DynMcDermott requires their compliance with DOE orders, directives, policies, plans and programs, and management directives for M&O contractors. Further, Section C.2, Part VII, subpart f, titled "Property," requires DynMcDermott to develop and implement an approved property management system that complies with DOE Property Management Regulations, orders, and directives.

Department of Energy Acquisition Regulation Part 970, "Management and Operating Contracts," and 41 CFR, Chapter 109, "Department of Energy Property Management Regulations," prescribes the DOE policy for personal property management. Guidelines for utilization of government property at DOE locations are found in 41 CFR 109-1.5103, "Maximum use of property," which states:

"Property management practices shall assure that the best possible use is made of property. Supplies and equipment shall be generally limited to those items essential for carrying out the programs of DOE effectively. Adequate staff review shall be made of operating programs to coordinate and plan future supply activities and to assure against overstocking, waste, and improper use of property."

41 CFR, Chapter 109, also provides guidelines for

identification, and appropriate disposition, of idle government equipment. Specifically, 41 CFR 109-25.109-1, "Identification of idle equipment," states that:

"As a minimum, management walk-through inspections shall be scheduled to provide for coverage of all operating and storage areas at least once every two years to identify idle and unneeded personal property. . . . Equipment identified as idle and unneeded shall be redeployed, reassigned, placed in equipment pools or declared excess, as appropriate."

The DOE Property Management Regulations also set forth guidelines to be followed when government equipment has no current use, but has a potential future use. Such equipment is defined as "equipment held for future projects (EHFFP)." In order for EHFFP to be retained, an approved justification must document a known future use, or potential use, in planned projects. Specifically, 41 CFR 109-27.5102, "Objective," in setting out the objective of the EHFFP program, states that:

"The objective . . . is to enable DOE offices and contractors to retain equipment not in use in current programs but which has a known or potential use in future DOE programs, while providing visibility on the types and amounts of equipment so retained through review and reporting procedures. It is intended that equipment . . . be made available for use by others, and that equipment no longer needed be promptly excessed."

Four Spectrometers Have Never Been Used for Intended Purpose

Analysis for oil and grease levels in stormwater samples is required at the SPR storage facilities to comply with NPDES and state environmental permits. During the mid-1980s, a BPS analytical laboratory staff member learned of available technology which would allow oil and grease level analyses to be performed by an infrared spectrometer method. However, EPA had not approved compliance analyses by this method. BPS staff believed that the infrared spectrometer method would improve the efficiency of laboratory operations, and consulted with EPA officials about obtaining special approval to utilize this method in SPR laboratories.

A DynMcDermott environmental manager, formerly employed as a BPS environmental manager, recalled that the EPA wanted equivalency testing conducted with an infrared spectrometer at a SPR site prior to method approval. Such testing would have demonstrated that infrared spectrometer analysis was equivalent to the method it was proposed to replace. In late 1985, BPS environmental officials completed a request to purchase one infrared spectrometer for use in

equivalency testing. However, we were told that, during a procurement meeting about the spectrometer purchase, a former BPS finance director decided sufficient money was available to procure several spectrometers in anticipation of EPA approving the method.

SPR property records show that three infrared spectrometers were acquired during September and October 1986, at a cost of $29,481 each. Another spectrometer was acquired in June 1988, at a cost of $29,900. The environmental manager described this equipment as being "cutting edge" technology when it was new.

After these devices were purchased, the environmental manager told us EPA officials, based upon review of equivalency testing data, denied permission for the use of the infrared spectrometer method. Thus, the four spectrometers could not be used for their intended purpose. Rather, the spectrometers were retained, without proper EHFFP designation, in anticipation that EPA approval of their use could be secured at a future date. The environmental manager told us a BPS staff member, who had originally identified the infrared spectrometer method, did find a few isolated uses for the purchased equipment. This staff member left the company in approximately 1990. The spectrometers have been idle since this staff member's departure, as other analytical staff members were not trained to use the equipment.

In November 1993, DynMcDermott submitted applications to the EPA for renewal of NPDES permits at the SPR. In these applications, DynMcDermott again requested EPA's permission for use of the infrared spectrometer method for oil and grease analysis. DynMcDermott also requested permission to greatly reduce the frequency of oil and grease analyses. At present, during periods of rain, daily samples of stormwater must be analyzed. If approved, the revised permits would reduce this analysis frequency to once per quarter. Consequently, the need for the idle infrared spectrometers, even if approved by EPA for use, would also significantly decrease. (EPA's decision on these applications was pending at the completion of our inspection field work.)

Ion Chromatograph Analyzer Idle Since 1990

We were told that based on an engineering requirement, the BPS Cavern Engineering organization arranged procurement of an ion chromatograph analyzer, and related optional equipment, for use at Bryan Mound's analytical laboratory. This device was to perform certain ion testing on brine generated during the leaching process. Leaching is a process utilized to expand the salt dome caverns where SPR crude oil is stored.

SPR property records show the ion chromatograph was acquired in June 1988 at a cost of $19,623. Six pieces of

associated optional equipment were acquired at the same time, which increased the total purchase cost to $29,841.

The ion chromatograph analyzer, and optional equipment, has not been used since 1990, when a site chemist, who was the only employee familiar with these devices, left BPS. Laboratory personnel hired at Bryan Mound since the former chemist's departure, including those hired by DynMcDermott, have not received training in use of the ion chromatograph. Although this equipment has remained idle since 1990, the ion chromatograph and options have not been placed on an excess list, or designated as EHFPP.

Conclusions

Based on our review of circumstances surrounding the procurement of four infrared spectrometers, we concluded that purchase of three spectrometers not needed for equivalency testing resulted in an unnecessary expenditure of approximately $89,000.

We also concluded that appropriate actions should have been taken to assure the best possible use of the four infrared spectrometers and the idle ion chromatograph analyzer, in accordance with DOE Property Management Regulations.

Recommendations

We recommend that the Manager, Strategic Petroleum Reserve Project Management Office, direct DynMcDermott to:

4. Take appropriate action, in accordance with Department of Energy Property Management Regulations, to assure that the best possible use is made of the four infrared spectrometers and the idle ion chromatograph analyzer.

5. Review their property management system to determine if the system has adequate controls to ensure proper implementation of DOE Property Management Regulations relating to the best use of equipment.

Strategic Petroleum Reserve Project Management Office officials concurred with Recommendations 4 and 5. SPRPMO officials stated that several corrective actions are being taken, or have been taken, since the inspection was conducted. Specific actions are provided below.

Recommendation 4. "The four spectrometers and one chromatograph identified in IG-40 report were excessed by DM Property during the October-December 1994 time frame. This item is considered closed."

Recommendation 5. "DM issued their Supply Services Manual, which was reviewed by the DOE Contractor Personal Property System Review in April 1994, and conditionally approved.

This manual defines the management system to control property and equipment which includes DM Equipment Usage Reporting System and defines management responsibilities. . . . DOE will specifically target this area as part of a Fiscal Year 1995 follow-up review of the Management and Operating contractor property system, scheduled to be completed by August 31, 1995, with a report to be completed by September 30, 1995. This item will be considered closed with the completion of the follow-up review report."

LACK OF TIMELY DISPOSAL OF AN UNNEEDED RADIOACTIVE CHEMICAL

Laboratory employees at one SPR site worked around the potential hazards associated with an unneeded radioactive chemical during its long-term storage. A small quantity (approximately 10 grams) of this chemical, Uranyl Acetate, had been stored in a SPR site laboratory for more than 10 years. Current SPR personnel do not know how the radioactive chemical got into the laboratory, or why. DynMcDermott officials we contacted were unable to determine how, when, or why an additional 15 grams of this chemical may have been utilized. Knowledgeable SPRPMO and DynMcDermott officials estimated labor costs ranging between $10,000 and $20,000 had been incurred in repeated attempts to arrange for disposal of the Uranyl Acetate, which had a value of approximately $100. Disposal efforts, and the steadily accumulating disposal costs, were continuing at the conclusion of our inspection field work.

Origin and Past Possible Uses of Chemical Unknown

We found that a small quantity of an unneeded radioactive chemical, Uranyl Acetate, has been stored at the Bryan Mound SPR Site Laboratory for more than 10 years. Uranyl Acetate is a low-level radioactive and toxic compound. DynMcDermott's ES&H Manager at Bryan Mound, who was a Bryan Mound environmental specialist with BPS, told us current SPR personnel do not know how the Uranyl Acetate got into the Bryan Mound laboratory, or why. This statement was supported during discussions with other DOE and DynMcDermott environmental officials, and during review of DynMcDermott and BPS documents pertaining to the Uranyl Acetate. However, our review found BPS environmental officials knew of the presence of Uranyl Acetate at Bryan Mound as early as May 1986. At that time, BPS published a chemical inventory list for Bryan Mound, which showed an unspecified amount of Uranyl Acetate present at the site laboratory.

Hazards Associated with Uranyl Acetate

Material Safety Data Sheets (MSDS) provide safety information about chemicals, such as physical data, toxicity, health effects, transportation data, and fire/explosion information. According to an MSDS for Uranyl Acetate, this chemical may emit poisonous gases when heated to decomposition, as could occur in a laboratory

fire. As related to toxicity, the Uranyl Acetate MSDS states:

"SOLUBLE URANIUM COMPOUNDS, SUCH AS URANYL ACETATE, MAY CAUSE IRRITATION OF THE EYES AND LUNG DAMAGE; THE TARGET ORGAN FOR THESE COMPOUNDS IS THE KIDNEY, TO WHICH THEY CAN CAUSE GREAT DAMAGE AND RENAL FAILURE. THE TOXICITY MAY BE EFFECTED THROUGH SKIN ABSORPTION, INDIGESTION, AND ESPECIALLY INHALATION. THE CHEMICAL TOXICITY IS MORE SIGNIFICANT THAN THE RADIOLOGICAL TOXICITY."

Thus, an undetermined number of laboratory employees at the Bryan Mound Site have worked around the potential hazards associated with the unneeded Uranyl Acetate during its long-term storage.

Requirements for Disposal of Radioactive Materials

We contacted the Chief, Radiation Protection Unit, Air, Water, and Radiation Division, Office of Environmental Guidance (Unit Chief), at DOE Headquarters. The Unit Chief told us that the SPR Uranyl Acetate should be treated as a low-level radioactive compound, and that timely disposal of unneeded quantities should occur since Uranyl Acetate is also a toxic chemical. The Unit Chief also advised that disposal of the Uranyl Acetate is governed by the DOE orders dealing with radiation protection, including the provisions of DOE Order 5820.2A, "Radioactive Waste Management."

DOE Order 5820.2A establishes DOE policies, guidelines, and minimum requirements for management of radioactive waste. This Order defines radioactive waste as "Solid, liquid, or gaseous material that contains radionuclides regulated under the Atomic Energy Act of 1954, as amended and of negligible economic value considering costs of recovery." This Order establishes the DOE policy that low-level waste be managed and disposed of so the radioactive components are contained, and cost effectiveness is maximized.

Efforts Unsuccessful to Dispose of Unneeded Chemical

Over the past several years, efforts have been undertaken by the current M&O contractor and former MOM contractor to dispose of this chemical. Records indicate BPS undertook disposal efforts for the Uranyl Acetate in December 1991, with efforts continuing without success throughout the remainder of the BPS contract. DynMcDermott, the successor contractor, renewed disposal efforts which have also been unsuccessful.

The DOE Headquarters Unit Chief discussed various disposal options with us. The Unit Chief also stated that those officials attempting to dispose of the Uranyl Acetate should have contacted his office, or other waste management

elements at DOE Headquarters, for assistance.

A majority of the documented contacts concerning disposal of the Uranyl Acetate took place between SPR contractor employees and employees at other DOE contractor facilities, private companies, and governmental entities. The records documenting these contacts show that the Uranyl Acetate disposal problem, while discussed with SPRPMO officials, was never elevated to waste management officials at the DOE Headquarters level.

While it would be impossible to determine the exact amount spent, knowledgeable SPRPMO and DynMcDermott officials estimated labor costs ranging between $10,000 and $20,000 had been incurred in repeated attempts to arrange for disposal of the Uranyl Acetate, which had a value of approximately $100. Disposal efforts, and the steadily accumulating disposal costs, were continuing at the conclusion of our inspection field work.

Quantity Of Uranyl Acetate Misstated

The fact that the quantity of the Uranyl Acetate was also misstated may have also contributed to the unsuccessful disposal efforts. According to records documenting the unsuccessful disposal attempts, the quantity of Uranyl Acetate at the Bryan Mound Site Laboratory had been consistently overstated. Some documents repeatedly described the chemical's quantity as 25 grams, while other documents repeatedly described the quantity as 20 grams.

We examined the Uranyl Acetate container, bearing Lot Number 772764, and noted the supplier had affixed a label stating the container held 25 grams when initially received. At the time of our examination, the container was only partially full, containing approximately 10 grams of the chemical. DynMcDermott officials contacted were not able to determine how, when, or why an additional amount of approximately 15 grams of this chemical may have been utilized.

Conclusions

We concluded that the long-term storage of Uranyl Acetate, an unneeded radioactive chemical with toxic properties, resulted in an undetermined number of Bryan Mound Site laboratory employees working unnecessarily around the potential hazards associated with this chemical for more than 10 years. We further concluded that the repeated, unsuccessful attempts to dispose of this chemical, valued at $100, resulted in unnecessary labor expenditures estimated between $10,000 and $20,000. DOE policy states that low-level waste should be managed and disposed of so as to maximize cost effectiveness.

Recommendation

We recommend that the Manager, Strategic Petroleum Reserve

Project Management Office, direct DynMcDermott to:

6. Take appropriate action, in accordance with DOE's policy on low-level waste, to dispose of the SPR's unneeded Uranyl Acetate in an expeditious and cost effective manner.

Strategic Petroleum Reserve Project Management Office officials concurred with Recommendation 6. SPRPMO officials stated "The Uranyl Acetate has been disposed. It was transferred to Louisiana State University, Baton Rouge, in June 1994 to be used for electronmicroscopy. This item is considered closed."

Appendix A

Other Reviews Identifying Problems Associated with Preparation of the Strategic Petroleum Reserve's (SPR) Laboratory Programs and Procedures Manual

In addition to those reviews discussed on page 10 of the report, we analyzed several other reviews which identified problems associated with the preparation of laboratory standard operating procedures for the SPR. These reviews stressed the preparation of a procedural document, which was referred to in the reviews and by analytical staff as the "Laboratory Programs and Procedures Manual" (LPPM). Synopses of these reviews follow.

A SPRPMO On-Site Management Appraisal of the West Hackberry SPR Site, conducted April 16-20, 1990, mentioned that the Louisiana Department of Environmental Quality (LDEQ) had made suggestions pertaining to laboratory procedures. These suggestions resulted from an LDEQ Water Pollution Control Division unannounced inspection of the West Hackberry Laboratory on March 23, 1990. Also, a Boeing Petroleum Services, Inc. (BPS), Award Fee Self Assessment for the Performance Period of April 1, 1990, to September 30, 1990, noted the management, operating, and maintenance contractor's environmental procedure manuals needed updating, and that the revision schedules were continually slipping.

In March 1991, a SPRPMO Environmental, Safety, and Health (ES&H) Performance Evaluation Committee (PEC) Report for the period from October 1, 1990, through March 31, 1991, was issued. This PEC Report found BPS deficient in updating basic environmental manuals.

A BPS Award Fee Self Assessment, for the period April 1, 1991, through September 30, 1991, stated BPS had identified as a "notable program weakness" that environmental procedures had not been completed in a timely manner.

A September 4, 1991, SPRPMO Award Fee Determination Plan transmitted to BPS the ES&H PEC Objectives and Criteria for the Evaluation Period October 1, 1991, through March 31,

1992. This plan listed as a criterion the effective management of an environmental protection program, with particular emphasis on updating the environmental procedures manuals by January 31, 1992.

On December 31, 1991, the BPS Contracts Manager sent a letter to the Chief, SPRPMO Contracts and Acquisition Branch, on the subject of BPS Award Fee Goals for the six month period commencing October 1, 1991. This letter listed short-term, interim, and long-term goals and implementation plans. The Short-Term (less than six months) Award Fee Goals and Implementation Plan of the BPS Environmental Control Section listed a BPS goal of completing revision of the Environmental Programs and Procedures Manual by March 20, 1992. Also listed as a goal was completion of the draft Laboratory Programs and Procedures Manual by February 14, 1992.

An April 6, 1992, BPS Award Fee Self Assessment for the Performance Period October 1, 1991, through March 31, 1992, identified, as a continuing notable program weakness, the fact that environmental procedures had not been completed in a timely manner. However, BPS said that this matter had management's attention.

An October 5, 1992, BPS Award Fee Self Assessment for the period April 1, 1992, through September 30, 1992, acknowledged environmental and laboratory procedures had not been completed in a timely manner, and that this was a serious program weakness.

A SPRPMO Award Fee Recommendation, dated October 29, 1992, for the period April 1, 1992, through September 31 [sic], 1992, found strong emphasis needed to be placed on completing corrective actions emanating from the Tiger Team Assessment. This Award Fee Recommendation found reschedules were submitted after the fact, rather than in a timely manner before deadlines. Failure to complete milestones as agreed, such as the BPS environmental manuals and several DOE Order 5400.1 plan milestones, was also reported as a developing problem. Further, six instances were found indicating the serious lack of attention to the requirement for an acceptable crude oil quality program, resulting in the reliability of BPS generated crude oil quality data being questionable.

On November 23, 1992, BPS prepared a Tiger Team corrective action plan addressing laboratory standard operating procedures. This plan indicated laboratory procedures were to be prepared by February 28, 1993. The corrective action plan showed that a training plan on laboratory procedures was to be implemented by May 30, 1994.

The "Expectations, Goals, and Priorities" of the PEC for Operations and Maintenance, for the Award Fee Evaluation Period Ending September 30, 1993, specified that

DynMcDermott must ensure that Conduct of Operations at the SPR facilities are managed with a consistent and auditable set of requirements, standards, and responsibilities. The Award Fee Determination Plan for the period April 1, 1993, through September 30, 1993, specified an evaluation criterion to assess DynMcDermott's effectiveness in scheduling and implementing corrections for Tiger Team and other identified deficiencies.

In June 1993, the SPRPMO ES&H Division conducted an appraisal of the SPR non-regulatory groundwater sampling and analysis program. This appraisal reviewed the "tools" in place for employees to use in carrying out their duties under this program. Also, the appraisal reviewed the groundwater sampling and analysis program against a Tiger Team Groundwater Sampling and Analysis Corrective Action Plan. This appraisal found that none of the SPR sites conducting groundwater sampling and analysis had approved procedures for the collection, analysis, recording, or reporting of this type of sampling and analysis data. The appraisal also found a Tiger Team corrective action plan milestone for developing standard laboratory procedures was behind schedule. In lieu of a procedural document, the appraisal found new site personnel learned groundwater sampling and analysis, in part, through the availability of the SPR Environmental Monitoring Plan. However, the version of this plan in effect at the time, which was signed by the then SPR Project Manager in October 1991, referred readers to the nonexistent Management and Operating contractor's LPPM for guidance on procedures.

In August 1993, DynMcDermott prepared a revised Tiger Team corrective action plan which showed laboratory standard operating procedures were to be completed by February 28, 1994. This plan was later revised to show laboratory standard operating procedures would be completed by December 31, 1994, with procedural training to be completed by March 31, 1995. A DOE Oversight Designee approved this revision on September 1, 1993.

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