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Technical Safety Appraisal of the Strategic Petroleum Reserve West Hackberry/Big Hill/ New Orleans

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Technical Safety Appraisal of the Strategic Petroleum Reserve West Hackberry/Big Hill/ New Orleans

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TECHNICAL SAFETY APPRAISAL

OF THE

STRATEGIC PETROLEUM RESERVE

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TECHNICAL SAFETY APPRAISAL
STRATEGIC PETROLEUM RESERVE

WEST HACKBERRY/BIG HILL/NEW ORLEANS

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ACRONYMS

A/E.....Architect Engineer
ANSI.....American National Standards Institute
API.....American Petroleum Institute
BPS.....Boeing Petroleum Services
BTR.....BPS Technical Representative
CIL.....Critical Items List
CIP..... Capital Improvement Project
CMT.....Crisis Management Team
DOE.....Department of Energy
DOL..... Department of Labor
DOT.....Department of Transportation
ECC.....Emergency Control Center
ECP.....Engineering Change Proposal
EMT.....Emergency Medical Technician
EPA.....Environmental Protection Agency
ERT.....Emergency Response Team
ESD.....Emergency Shutdown Device
FAR.....Federal Aviation Regulation
FM..... Factory Mutual
FPTS.....Fire Protection Audit Tracking System
FRACAS.....Failure Reporting Analysis and Corrective Action System
GIDEP.....Government Industry Data Exchange Program
HATS.....Hazard Abatement Tracking System
HPPP.....High Pressure Pump Pad
ILS.....Integrated Logistics Support
IRI.....Industrial Risk Insurers
LPPP.....Low Pressure Pump Pad
MOV.....Motor Operated Valves
MRC.....Maintenance Requirement Card
MSDS.....Material Safety Data Sheets
MTE.....Measurement and Test Equipment
MTSAA.....Multidiscipline Technical Safety Assurance Appraisal
NCR.....Nonconformance Report
NDT.....Non Destructive Test
NEC..... National Electric Code
NFPA.....National Fire Protection Association
NOLA.....New Orleans, Louisiana
NON..... Notification of Noncompliance
O&M.....Operations and Maintenance
OP.....Operating Procedure
OSHA.....Occupational Safety and Health Administration
PEL.....Permissible Exposure Limit
PM.....Preventative Maintenance
PPC..... Project Planning and Control
QA.....Quality Assurance
QC.....Quality Control
QIR.....Quality Inspection Control
RAM.....Reliability, Availability, and Maintainability
ROD.....Report of Discrepancy
RWIS.....Raw Water Intake Structure

SAM.....Site Availability Mode
SAR.....Safety Analysis Report
SCBA.....Self Contained Breathing Apparatus
SCMG.....Site Crises Management Group
SPR.....Strategic Petroleum Reserve
SWP.....Safe Work Permit
TWA.....Time Weighted Average
UOR.....Unusual Occurrence Report
WH&A.....Walk, Haydel and Associates

I. INTRODUCTION

The Department of Energy (DOE) initiated the development of the Strategic Petroleum Reserve (SPR) in 1976. Since that time, the Department has been involved in a development program to stockpile crude oil in major storage facilities. The SPR facility development program is presently designed to provide a cumulative storage capacity of 750 million barrels and a drawdown/distribution capability of 4.5 million barrels per day. Currently, over 560 million barrels of oil are stored in the SPR facilities.

The SPR has been operated by Boeing Petroleum Services (BPS) since 1985 under a Management and Operations contract. BPS is a wholly owned subsidiary of the Boeing Company and is located in New Orleans, Louisiana. The BPS New Orleans Project Manager reports to the Vice President of Operations of the Boeing Aerospace Company in Seattle, Washington.

Over the last 12 years, the SPR has acquired and developed six underground crude oil storage facilities in salt domes along the gulf coasts of Texas and Louisiana and a government-owned marine terminal on the Mississippi River at St. James, Louisiana. The six storage sites are Bayou Choctaw, Weeks Island, West Hackberry, and Sulphur Mines in Louisiana and Bryan Mound and Big Hill in Texas. These six storage sites are organized into three distribution systems connected by DOE pipelines to commercial crude oil pipeline networks and marine terminal facilities for drawdown and distribution. The project office in New Orleans includes engineering, technical support, administrative and management staffs.

This report presents the results of a multidiscipline Technical Safety Appraisal of the SPR operations. The TSA appraised the West Hackberry site where leach and fill operations were being conducted and the Big Hill facility where construction and leaching operations were nearing completion. These sites are considered to be representative of all SPR operations. Additionally, the TSA appraised the safety related function performed by the New Orleans Project Office of BPS.

The West Hackberry site, located in Cameron Parish, Louisiana, approximately twelve miles southwest of Lake Charles, has been expanding and is developing additional caverns. Oil is being received for storage. There are approximately 110 employees on site.

The Big Hill site, located in Jefferson County, Texas, twenty miles southwest of Beaumont, was acquired in 1982 and has been solely developed by DOE. Construction activities and cavern development are nearing completion with oil fill operations scheduled to begin in May 1989. There are approximately 116 employees on site.

The SPR storage sites consist of oil storage caverns, wells for leaching and drawdown, raw water intakes and associated piping, oil transport piping and offsite piping, electrical systems, oil metering stations, brine ponds, and associated onsite piping/offsite pipelines and auxiliary equipment, and backup emergency systems and equipment in support of operations. The principal hazards presented in operating SPR facilities are fire, oil spills, occupational safety, and industrial hygiene considerations.

The appraisal was conducted by a team assembled by the Office of Quality Programs under the Deputy Assistant Secretary for Safety, Health and Quality Assurance. The appraisal team observed both operational and non-operational activities at the sites appraised. The New Orleans appraisal reviewed the programmatic, oversight, and management activities that affect the safety of operating and maintaining the SPR. The appraisal was conducted at West Hackberry, Louisiana, December 5 to 13, 1988; Big Hill, Texas, January 8 to 17, 1989; and New Orleans, Louisiana, January 23 to February 3, 1989. In addition the team interviewed the Vice President, Operations of the Boeing Aerospace Company in Seattle. Team members and their assigned areas are included in Attachment 4. Biographical data for each team member is included in Attachment 5.

The team's efforts were guided by a set of pre-established Performance Objectives with supporting criteria. This report contains the findings and impressions obtained relative to each Performance Objective. The concerns identified by the appraisal team are located under the Performance Objective felt to be the most relevant to the concern. In many cases, findings supporting the concern can also be found under other Performance Objectives. When this is the case, cross-references have been provided. A tabulation of all concerns expressed in this report can be found as Attachment 2.B.

A concern addresses a situation that either 1) reflected less than full compliance with DOE safety and health requirements or mandatory safety standards; 2) threatened to compromise safe operations or 3) if improved, would substantially enhance the safety excellence of that particular operation even though the operation was judged to have a currently acceptable margin of safety. Because of this last category, addressing the excellence of the operations, more concerns are reported that would result from a strictly compliance-oriented appraisal. To help the reader, the concerns have been classified in accordance with a system for categorizing concerns (Attachment 1). The appraisal results are categorized for seriousness in Attachment 2.

This appraisal is an evaluation at a fixed point in time. As a result, improvements to safety that were planned or even underway but not completed at the time of the appraisal are identified as concerns if failure to complete them would significantly impact the safety of operations.

The findings and concerns developed by the appraisal team were shared with the management of the Strategic Petroleum Reserve Project Management Office (SPRPMO) and BPS in an exit meeting held on February 3, 1989. This final report has been validated for factual accuracy with SPRPMO and BPS.

II. PERFORMANCE EVALUATION

This is the first Technical Safety Appraisal (TSA) conducted for the Strategic Petroleum Reserves (SPR) operated and managed by Boeing Petroleum Services (BPS). DOE oversight is provided through the Oak Ridge Operations Office. This program includes an excellent maintenance tracking system. The overall safety performance is considered adequate. A good safety culture and a strong safety and health program has been developed by BPS at the New Orleans Office (NOLA). However, it is not being effectively implemented at the sites because of inadequate oversight from NOLA.

The BPS safety program is predicated on the New Orleans office technical managers providing safety guidance, technical support, and policy management. In reality, however, site management operates nearly autonomously with respect to NOLA. As a consequence, the site managers consider the safety program to be the sole property of their sites, with NOLA contributing to the solution and/or identification of problems only upon specific request. The technical safety expertise is with NOLA and, since each site has only a lone safety administrator not having expertise in all the technical areas, site management is unable to properly identify potential safety problems.

The facilities present a neat appearance and housekeeping is good, but they contain numerous safety hazards that were not being identified and, in some cases, were incorrectly judged by line managers to be insignificant. For instance, the appraisal found inadequate (or absent) flame arrestors, spliced ground wires (e.g., to a 4160 volt motor), a broken boom angle on a crane that would preclude the operator reading the load chart to determine load handling capacities, inadequate testing and inspection of respirators, faulty procedures, and conventional electrical fixtures used in areas where explosion proof equipment is needed.

BPS has a well-planned audit program that was developed at the NOLA management level. Despite this well-planned program, only rudimentary issues are being identified and resolved. The BPS audit plan is not effective in identifying the technical safety concerns found by the appraisal. Furthermore, SPR lacks a technical resource knowledgeable in transportation and shipping regulations.

The SPR sites lack a well-defined training program. The existing training program (with the exception of Emergency Response Team training) has not been standardized and it is not well controlled, tracked, or documented at all sites.

Enforcement of site safety practices and procedures between BPS subcontractors and DOE contractors is inconsistent. Site safety practices and procedures are communicated to BPS subcontractors and compliance is effectively enforced. However, the same degree of enforcement does not apply to outside contractors working for DOE on SPR sites.

While the BPS intent in good, the safety program is not carried out at the working level, and DOE oversight from the SPR project office and from the Oak Ridge Operations Office has not realized the discrepancy.

III. REVIEW FINDINGS

Each of the Performance Objectives that was considered during the appraisal is discussed in this Section. Facility documents were reviewed; discussions were held with management, operations, technical support, and craft personnel; and routine activities and the physical condition of the facilities and equipment were observed. Observations from emergency response exercises are included. The discussion that follows the statement of each Performance Objective addresses the more pertinent facts obtained, observations made, conclusions drawn, and presents concern where applicable.

A total of 64 Performance Objectives in 9 subject areas have been addressed by this appraisal. Concerns shown in 19 of these Performance Objectives have been identified; however, there are many cross-references to the concerns in other areas. The concerns are categorized for seriousness in Attachment 2.

A total of 29 concerns is contained in the report which pertain to achieving compliance with some aspect of a DOE requirement or to achieving a greater level of safety. Each concern has been rated as to its seriousness in accordance with the rating system described in Attachment 1. None of these concerns addresses a situation that presented a "clear and imminent danger", although three concerns do require expedited attention by the contractor to ameliorate a significant risk. One concern (FP.5-1) involves fire protection life safety code violations. It relates to egress from fenced site pads. The other two (MA.1-1 and MA.2-1) involve safety hazards from facility material condition and the lack of training of BPS contractor personnel on workover rigs, respectively. BPS management was informed of the immediacy of these concerns. Corrective actions were initiated by BPS to rectify material deficiencies and to require training of contractor personnel.

Findings which lead to a specific concern are preceded with an asterisk. Those which do not lead to a concern are preceded by a "bullet".

A. PUBLIC PROTECTION

Emergency response personnel and equipment are adequate to deal with most credible accidents at these sites. An operational emergency preparedness program addresses all the elements of DOE 5500.3, "Emergency Preparedness Program and Notification System." The Big Hill and West Hackberry sites and operations do not pose a significant threat to the public and the environment. However, there are many inadequacies in plans, skills, equipment, and procedures identified by the team and observed during field emergency response exercises.

An emergency exercise was conducted at the two sites visited. The site Emergency Response Teams were promptly activated and sent to the accident scenes. Their performances were judged to be good overall, but numerous shortcomings were apparent as described in the report and in one case the critique was also deficient.

Written critiques of site drills and exercises are weak and are not distributed for beneficial use by others. There are no mechanisms to portray the overall training status nor criteria to certify training adequacy of individuals. Analysis of a range of scenarios with multiple failures and operator errors has not been made to identify the need for specialized equipment, training, procedures, and manuals not otherwise addressed.

An offsite training program provides Emergency Response Team (ERT) members with skills in first aid, fire fighting and security. These are supplemented and maintained by weekly ERT drills at the sites and one annual large scale exercise. The Site Manager is responsible for conduct of the site ERT training as well as for the other emergency response capabilities and activities at his site.

The NOLA Emergency Management group is peripherally involved in these site activities. The group primarily performs staff activities, such as writing of emergency plans, planning of field exercises, exercising the NOLA emergency organization and responding to requests from the DOE New Orleans office. There is little evidence of an intimate NOLA involvement at the site level, to provide assistance in training and to acquire information for improving Emergency Preparedness Procedures throughout SPR.

The plans and procedures that do exist are inadequate because they are incomplete, poorly organized, and contradictory. Plans and procedures lack site specific details, are cumbersome to use, and are sometimes erroneous because planned changes have not yet been incorporated.

A.1 PUBLIC PROTECTION PROGRAM CONTENT - PP.1

PERFORMANCE OBJECTIVE: The facility should not pose an unreasonable threat to workers, the public, and the environment as the result of operations permitting the (accidental) release of hazardous materials.

FINDINGS:

- Accidental releases of brine or crude oil are the only potential threats posed to the public and the environment by operation of the facility. Systems are in place to mitigate this threat.
- Major uncontrolled depressurization of a cavern near the site boundary, such as occurred at West Hackberry in July 1986, could result in significant offsite oil accumulation. In the 1986 incident, the oil was effectively recovered, and environmental damage has been substantially repaired through natural processes. A major fire would not be expected to have offsite consequences other than smoke.
- Upset procedures require shutdown when alarms indicate abnormal conditions. Most credible offsite spill accidents would be accompanied with changes in routinely monitored pressure and flow rates that would permit reconstruction of approximate released quantities.
- There is an operating program for the inspection of offsite oil and brinelines.
- To extend brineline lifetimes at both sites, an oxygen scavenging system is used. This system is checked daily and manually adjusted as necessary.
- Upset procedures do not assure the scavenging system will be turned off in the event of a brine leak. The scavenger (ammonium bisulfite) is toxic to aquatic life and humans. Its threshold limit value is 5 ppm.
- When the West Hackberry brineline is restarted after shutdown, the brine is reported to be "milky" and has higher than expected levels of dissolved oxygen; this condition may remain for two days. This suggests that air has entered the system.
- West Hackberry brineline pressure and flow data are communicated to the site via telephone or radio communications.
- The West Hackberry brineline to the Gulf is wearing from erosion and corrosion. Engineering studies have resulted in derating the pressure to mitigate the condition.

- o A Corrosion Monitoring Plan (Publication D506-01844-08, published May 4, 1988) is being implemented at Big Hill for raw water and brine pipeline and piping systems. The plan includes the preparation and installation of corrosion coupons and related fixtures.

- o Contingency plans exist to contain onsite oil spills. The dikes around Big Hill caverns will contain 36,000 bbls; whereas 47,745 bbls could be accidentally released from a pressurized cavern. During an ERT exercise conducted for the MTSAA Team, the simulated action showed that the site could contain any overflow.

CONCERN: None.

A.2 FACILITY EMERGENCY PLAN - PP.2

PERFORMANCE OBJECTIVE: The emergency plan and its supporting documents should describe an effective response to abnormal conditions.

FINDINGS:

o The management and implementation of emergency response plans and procedures will be reviewed under the newly instituted Management Effectiveness Audit (MEA).

* The emergency management criteria used in the MEA are heavily oriented toward verification that documents and resources are in place as required by BPS plans. Few of the criteria probe the quality of these resources and quality of performance. As examples the criteria address:

  - Whether plans include classification of emergencies, but not whether staff are able to correctly classify emergencies.

  - Whether plans include protective actions, but not whether staff have adequate guidance and training to select protective actions .

  - Whether the site Emergency Planning Group meets quarterly and documents its meeting, but not whether the group usefully addresses its full range of responsibilities as designated in the SPR Emergency Management Plan.

  - Whether ERT members have required training and technical skills, but not whether suitable procedures, standards and criteria have been used to make this determination.

  - Whether required exercises have been held, but not whether useful lessons are being learned.

  - Whether exercises are documented, but not whether the critiques are detailed, comprehensive, and reported in a useful style.

  - Whether records and logs are kept during an emergency, but not whether those records kept are adequate for satisfactory reconstruction of actions taken.

  - Whether telephone numbers are available, but not whether they are generally current.

CONCERN: See MC.5-4.

FINDINGS:

* Emergency plans and supporting documents at the sites are not all current, changes to documents are not always made when revisions are issued, and good document control is not practiced. As examples:

  - Emergency Procedures manuals refer to an older Emergency Management Preparedness Plan with a different title than the April 15, 1988, Emergency Management Plan now in use (D506-01001- 09). The latter does not mention that it replaces the earlier document.

  - A draft West Hackberry Security Contingency Plan (D506-01127- 09) dated October 1988, contains a draft site security plan and reentry procedures. Another document (S506-0162-03) with the same title and date was issued to the site directly from NOLA, bypassing Document Control.

  - The Big Hill Tactical Pre-fire Plans, an appendix printed separately from D506-01150-08, dated June 24, 1988, in the Control Room does not have a copy number and, as a result, is an uncontrolled document.

  - There are two different Upset Response Manuals in the West Hackberry Control Room (EAI-406-WH02 and D506-01264-03). Operators use the older D506 version; the shift supervisor has only the newer EAI version. (See Section PP.5.) The EAI Manual was transmitted to the site by BPS System Engineering as "Ready for interim use pending decision to issue by O&M as is, or to issue as BPS controlled document".

  - The New Orleans Emergency Management Office has issued an Emergency Procedures document (D506-01193-03) and an Emergency Control Center Procedures document (D506-01043-03). Those two documents have been combined, reorganized, tab indexed, and supplemented with resource information by the West Hackberry site. The West Hackberry site uses this informal "handbook" or "redbook" for emergency responses. NOLA is aware of and has permitted use of this handbook since before September 1986. The West Hackberry site continuously updates the handbook and controls copies on site on an ad hoc basis. These site emergency procedures address all elements required to be addressed by DOE 5500.3.

* BPS began revising the SPR Emergency Procedure Manuals at the request of DOE/NOLA in late 1987. The DOE request is to produce one common overview document containing common procedures and guidance for use by all sites; additional

documents, one for each site, should contain site-specific information. These documents will replace the informal "handbooks" currently in use at the sites.

o The Public Affairs Emergency Plan is being updated as Appendix B to the BPS Emergency Management Plan (D506-01001-09) dated April 15, 1988. The sites are required to refer all public information requests to DOE/NOLA or the DOE Senior Site Representative.

* Site reentry following a site evacuation has safety, property, environmental, and security risks. Reentry will typically be preceded by a group of specialized personnel. Reentry procedures now reside in several manuals.

* Site specific hurricane procedures, elaborating Section 7 of the Big Hill emergency procedures, have not been written. Useful information exists in correspondence and minutes of meetings that could be integrated into procedures and check lists.

* The ERT Qualification Checkoff list, for ensuring adequate training of the individual to meet ERT needs, is not accompanied by procedures for its use, or criteria and standards defining what constitutes acceptable performance for each item.

* At both sites, Pre-fire Plans contain information specific to each facility needed for firefighting. However, temporary buildings and some information such as locations of electrical power cutoff installations and hazardous chemicals are not always contained in the plans.

* Some site-specific emergency procedures, pre-fire plans, and ERT qualification criteria are incomplete. Lack of good document control is permitting the use of some unapproved, incomplete, and obsolete emergency plans.

CONCERN: See MC.7-1.

FINDINGS: * Categories of emergencies (e.g., fires, bomb threats, transportation, hurricanes) have been listed in plans. However, a variety of credible accidents, including multiple failures such as additional loss of power and operator error have not been thoroughly analyzed for required emergency response as an input to emergency capabilities and plans (D506-01001-09, D506- 01150-08). Such analyses may reveal additional deficiencies.

CONCERN: (PP.2-1) (H2/C2) Analyses of a wide range of credible accident scenarios to develop appropriate emergency response and to identify equipment needs have not been performed.

FINDINGS:

- o A Recovery Task Force, as defined by 22OP-5, Rev. 2, plans and implements recovery from an unplanned event, such as an accident or hurricane, in cases of major damage or failure.
- o Copies of the agreements with mutual aid groups are available. A list of equipment available from mutual aid members is provided in West Hackberry site emergency procedures, and a similar list for Big Hill is in the review process prior to publication.

CONCERN: None.

A.3 EMERGENCY RESPONSE TRAINING - PP.3

PERFORMANCE OBJECTIVE: Emergency response training should develop and maintain the knowledge and skills for emergency personnel to respond to and control an emergency effectively.

FINDINGS:

- o Emergency Response Team (ERT) members receive training onsite that includes oil spill control and cleanup.
- o ERT leaders receive 48 hours of training annually, and ERT members receive 40 hours of training annually, at the ERT Academy at Lamar University. Detailed training records are kept for each ERT member. Before participation as team members, each must demonstrate adequate knowledge of the equipment and procedures in the areas of health and safety, fire, security, and environment.
- o All senior and supervisory personnel are aware of and are trained in the hazards posed by petroleum and hydrogen sulfide.
- * The West Hackberry site manager stated that his policy is to see that all operators have experience in exercises. However, the present ERT training record system (one file for each member) makes it difficult to obtain an overall view of training status. For example, one Control Room operator had participated in four exercises, but the relief operator had not participated in any.

CONCERN: See MC.6-2.

FINDINGS:

- o The Emergency Management Plan, D506-01001-09, and the SPR Emergency Readiness Assurance Plan, D506-0146-09, Sections 5.2 and 5.3, September 30, 1987 specify that exercises be conducted yearly for each site and every 14 (sic) months for two or more sites. Weekly ERT exercises are required, followed by an oral critique and written reports.
- o In addition, the DOE New Orleans Project Office requires the annual conduct of 14 Site Crisis Management Group (SCMG) exercises (2 at each site) and 12 New Orleans Crisis Management Team (CMT) exercises.
- o By combining the various emergency management exercises and security exercises, the schedule has been reduced to a total of 18 major exercises annually, plus one every two years that involves two or more sites. As of December 1988 these exercises are planned, conducted and evaluated by a subcontractor to BPS with involvement of the BPS Emergency Management staff.

* Field exercises have been conducted annually at West Hackberry. There had not been a field exercise at Big Hill prior to the MTSAA appraisal.

* Big Hill ERT drills have been scheduled weekly, as required by the Emergency Management Plan, on the topics of oil/brine spill, H_2S drill, first aid, bomb drill, and fire drill. Team leaders are responsible for the exercise content, training, critique, appraisal of student performance and written report. The team leaders are not provided either with exercise scenarios, or with guidance to help them plan their respective weekly exercises.

* Written critiques of past ERT exercises provide very little information. The exercise records also appear to include responses to actual emergencies, but the distinction is not made. "Problems Encountered" are recorded; but there are no entries on these records showing assigned follow up action or disposition.

* There is no required distribution to BPS headquarters of reports and critiques of the site ERT exercises and drills. Also, the Emergency Management Manager is not on the distribution for minutes of the site Emergency Planning Groups.

* The West Hackberry and Big Hill Emergency Preparedness Planning groups meet quarterly and provide a mechanism for discussion of training needs. The Groups discuss the training schedules, and equipment and communications needs. However, there is little evidence that, over the last 3 years, deficiencies in skills have been identified as a result of training and drills at Big Hill and West Hackberry.

* There are failures to capture emergency management information at the sites and use it throughout the SPR.

CONCERN: See MC.1-1.

FINDINGS:

* An exercise was conducted at West Hackberry for the appraisal team. In the written scenario that was distributed, lightning caused an explosion and fire in the slop oil tank; two persons were injured. The tank roof was carried into the nearby electrical substation by the strong 50-knot wind. The following findings and deficiencies were noted by the team during the exercise:

  - Security personnel were the first persons to respond to the drill and arrive at the scene. They did not conduct a survey for victims as required in Section 5.3.1 of Site Emergency Procedures.

- There was an unnecessarily long delay before the response team searched for and treated the two "victims", and a third "victim" who was introduced following distribution of the written scenario. (A major exercise conducted at West Hackberry in December 1986, also demonstrated a delayed search for victims). (See MC.6-2 and MC.1-1.)

- The mobile foam trailer did not arrive until 25 minutes had elapsed. It was observed that the proper fittings necessary to connect the system were not readily available.

- The site equipment lacked a short backboard needed to treat an injured "survivor". This person, with simulated neck injuries, was mishandled when removed from the pickup truck as a result of this shortcoming. (See PP.2-1.) The truck had first been rolled back from the fire scene.

- The BPS Safety Administrator informed the MTSAA team that, once the truck had been removed from the immediate danger, the handling of this victim should have been left until Emergency Medical personnel accompanying the requested helicopter arrived. (See PP.2-1 and MC.6-2.)

- Records and logs kept on the exercise in the Control Room and Emergency Control Center (ECC) did not adequately depict the series of events.

- A secretary assisted the Control Room Operator during the West Hackberry exercise, but did not assist in essential functions. The Control Room Operator briefed New Orleans four times during the 38 minute exercise, including at least once after the decision was made to activate the ECC. Upon activation, it is the ECC's responsibility to make these briefings. (See MC.6-2.)

- The response team gave no indication that they considered the hypothesized weather conditions for the exercise, namely lightning and strong winds. (See PP.2-1 and MC.6-2.)

- The site self-critique conducted after the exercise addressed none of the above deficiencies, and also did not consider if training might be needed. (See MC.1-1.)

o A full field emergency response exercise, designed by the MTSAA team, was also conducted at Big Hill. The self-critique following the Big Hill exercise was comprehensive and included all exercise participants. Discussions were open and many deficiencies were noted for attention.

* The Big Hill exercise scenario began with two persons seriously injured by a blown oil pressure gauge at one of the caverns, resulting in significant oil leak and oil accrual within the cavern dike. Written scenarios were not distributed; only that information necessary to initiate and continue the exercise was provided by the team. The scenario included fire ignition after the ERT arrived at the scene, activation of the ECC, simulated victim evacuation, and fire fighting. The following findings and deficiencies were noted by the team during the exercise:

  - The first site person to arrive at the scene, a shift supervisor, radioed the Control Room that there were "two men down". When asked whether this was a drill he responded "ten- four". Subsequent radio communications by site personnel did not always preface and conclude their statements with "this is an exercise". (See MC.6-2.)

  - The EMT responded to the "two men down" signal and treated victims while in the oil leak and prior to rescue from the potential fire hazard. (See PP.2-1 and MC.6-2.) The EMT did not apply continuous pressure to the simulated wound.

  - The ERT, on arrival, suited up with SCBA and tested for gases in the oil spill prior to removal of the victim and prior to any fire water or foam laydown. It is debatable whether this was an appropriate response; SPR guidance does not address this complex issue. (See PP.2-1 and MC.7-1.)

  - The subcontractor vacuum truck operator, at the scene when the "accident" happened, was informed that he was a participant in the exercise. Although the first on scene, he did not attempt to communicate to the Control Room or otherwise seek assistance, even though one victim's portable radio was near at hand. Subcontractors coming onsite are provided with safety information but are not briefed on proper emergency response notification. (See PP.2-1.)

  - The site simulated the shutdown of the affected cavern using a remotely operated valve that was actually not in service.

  - Only one water monitor was used although others were in an advantageous position. (The ERT later stated they decided that one was sufficient.)

- No protective foam or cooling water spray was laid on the vacuum truck which was in the oil, either before or after ignition. The ERT did not treat the truck as part of the exercise even though it was close to the well and would most likely have caught on fire.

- The Control Room and ECC had trouble keeping informed. It is noted, however, that some site senior personnel acted solely as observers during the exercise and were not available to facilitate information flow. (See PP.2-1.)

- Although appropriate notifications to concerned persons and offices were made by the Control Room and ECC, check off lists for the notifications were not used. Notifications are entered into the log book as required by procedure.

* The exercises conducted for the appraisal team disclosed deficiencies in: 1) equipment, practices, and skills, 2) failures to follow procedures specified in emergency manuals, and 3) an absence of training or guidance for some special circumstances.

CONCERN: See PP.2-1, MC.6-2, MC.7-1 and MC.1-1.

A.4 EMERGENCY FACILITIES, EQUIPMENT, AND RESOURCES - PP.4

PERFORMANCE OBJECTIVE: Emergency facilities, equipment, and resources should adequately support facility emergency operations.

FINDINGS:

- o The Emergency Management group in New Orleans is a staff office. It consists of four professionals with no staff in the field. The group duties are writing manuals, planning and conduct of major exercises, evaluation, overview and liaison with other organizations. It provides analyses and advice on request.

- o The BPS/NOLA Emergency Management group is heavily involved in responding to tasks and verbal requests from the DOE/NOLA Project Office. Such requests are for document reviews, surveys, writing manuals and plans under DOE guidance, and preparing and making presentations to various DOE offices.

- o The Fire Protection Specialist, Environmental Specialist, Site Safety Administrator and Site Security Administrator (located at the sites and reporting directly to their functional managers in NOLA) have site emergency management responsibility. They are assigned, through the Emergency Management Plan, responsibility for site ERT training. They may serve on the ERT and perform site duties at the request of the Site Manager.

- * Emergency management coordinators at the sites have been designated by the site managers. This is an additional duty assigned to management personnel. No position descriptions or documented work performance appraisals address these additional responsibilities, nor are there format training programs.

- o Action is now being taken to standardize the designation of site security administrators as emergency management coordinators also. The MTSAA team was assured that this additional responsibility would be incorporated in the revised position descriptions.

- * There is no separate discrete budget for emergency management other than for the staff in BPS headquarters and the training at Lamar University. Equipment and site training costs are provided from the Operations budgets as determined by Operations and the Site Managers. These expenditures are negotiated within the total budget between Operations, DOE and the Emergency Management group.

CONCERN: See MC.1-1.

FINDINGS:

* Rooms dedicated as Emergency Control Centers (ECCs) do not exist; ECC equipment is stored in the administration buildings. An alternate ECC does not exist at West Hackberry. Alternate Control Rooms do not exist at either site.

* Commercially available lightning observation systems are not used at the sites. The practice is to have all workers go inside when lightning is visually observed by supervisory personnel.

* The wind measuring systems at the sites are located near obstructions resulting in misleading data. The system at West Hackberry is inoperable. The readout for the Big Hill instruments is in a locked microwave building, not readily available for emergency or operational use; it was not used in the exercise.

* At both sites, severe weather alert is obtained from NOAA weather alert radios. Backup includes alerts that originate in the mutual aid radio system, and phone calls to weather stations and air traffic control towers.

* The Big Hill warning system has sirens at two places which are activated only from the Control Room. They are tested weekly.

* The Emergency Response Teams are alerted to an emergency by means of portable radio and the siren on the fire truck. During the MTSAA appraisal exercise at West Hackberry, the truck siren was not started immediately. When turned on, it was not audible sitewide.

* For total West Hackberry site evacuation, it has been necessary to use all patrol car sirens available on the site to assure site wide alert. The installation of fixed sirens or horns at West Hackberry is scheduled for FY 1990. This need was identified in 1983 and has been in the HATS tracking system ever since. (See MC.7-2.)

* Emergency response for some scenarios could be adversely affected by deficiencies in facilities and equipment that include alternate ECCs, lightning and wind observation systems, and site wide alert siren systems.

CONCERN:

See MC.5-1.

FINDINGS:

* Seriously injured persons must be transported to a doctor or hospital before treatment beyond immediate first aid response. Transport must be by ambulance or helicopter originating from offsite locations.

* DOE 5480.8 requires at least a part time physician and a full time registered nurse at sites with over 100 persons. The sites do not have the required medical staff. Big Hill has two certified EMTs; West Hackberry has none.

* There are two helipads at West Hackberry. The secondary pad near the main (south) gate has several obstructions that could interfere with safe landing and take off operations, particularly during periods of high wind and/or low visibility. There is one helipad at Big Hill with no obstructions.

* The radio tower at West Hackberry is not in compliance with Federal Aviation Regulation (FAR) Part 77, which pertains to obstruction marking and lighting. The tower does not have a required red light installed at an intermediate level.

CONCERN: See MC.5-5.

FINDINGS:

o There is an ample supply of first aid equipment and supplies at the West Hackberry first aid station. However, many of these supplies are kept in locked cabinets and are not organized for quick disbursement. A first aid kit is also kept on the fire truck.

o There are several first aid stations at Big Hill. The fire truck is equipped with emergency and first aid gear including stretchers, backboards, splints, H_2S meters, and self-contained breathing apparatus (SCBA).

o Hydrogen sulfide and explosive gas meters are not vulnerable to a single accident occurring at any one location because some meters are in operational use throughout the sites. No other hazardous gases requiring monitoring in emergencies have been identified.

o The Big Hill fire truck and its equipment are checked for readiness every shift.

o Adequate emergency communication systems exist. The sites have portable radios, a paging system for emergency personnel, radio relay systems, and redundant telephone systems. The emergency communications are on uninterruptable power supplies. A dedicated channel on the site portable radios is used in emergencies. Direct communications between the sites and New Orleans are by phone.

o Backup equipment and personnel are available to sites through mutual aid organizations. These contacts and arrangements,

some documented and some informal, are kept active through regular site representation to and hosting of mutual aid organization meetings.

- o The operations Control Room, Site Manager's office, Emergency Control Center (ECC) and an emergency response library are all located in the main administration buildings at both sites.

- o Emergency response team members display a collective knowledge capable of dealing with realistic emergencies in event of loss of the access to administration buildings.

- o In the event of the loss of incoming power to the site, automatic starting generators provide power to the administration buildings. A backup diesel driven pump, automatically started, exists for the fire system. A second backup, a manual start diesel driven pump, exists at West Hackberry.

- o Alarm and protection systems exist to detect a release of petroleum and brine. The alarm systems are maintained and calibrated on a schedule.

- o The available oil boom equipment at West Hackberry is sufficient to deal with an oil spill equivalent to that from a past cavern 111 accident. The Big Hill site has sufficient boom available to deal with a credible accident at that site. Arrangements have also been made to rent booms, and to obtain booms from other sites as needed.

CONCERN: None.

A.5 EMERGENCY ASSESSMENT AND NOTIFICATION - PP. 5

PERFORMANCE OBJECTIVE: Emergency assessment and notification procedures should enable the emergency response organization to correctly classify emergencies, assess the consequences, notify emergency response personnel, and recommend appropriate actions.

FINDINGS:

- o Site-specific Upset Response Manuals are intended to aid the Control Room Operator in selecting the correct actions in response to particular combinations of alarms and changes in pressure readings (also, see Section ST.2). These manuals are 120-150 pages, and include upset conditions ranging from break of an oil line at a pressurized cavern (urgent and serious) to damage to a raw water intake pump (not nearly as time-urgent). About 85 conditions are included in the Big Hill manual.

- o The Control Room Operators respond to symptoms and indicators of conditions, such as to high and low flow rates and pressure alarms. This response is predetermined by the Upset Response Manuals and by Operator training and understanding of the systems. The response precedes visual confirmation of the specific nature of an accident, and in some cases precedes determination of whether an accident has truly happened (such as response to indications of a breach in a piping system). This immediate response, to plant indicators that an event has occurred or may be in progress, is in accord with good practice.

- * The day shift West Hackberry Control Room Operator on December 15, 1988, did not readily know the location of the Upset Response Manual, and does not refer to it when responding to emergencies.

- * The more recent, interim EAI West Hackberry Upset Response Manual of 1987 is not easily understood and will require training in its use. (See Section PP.2).

- * DOE 5500.2A and DOE 5500.3 require prompt recognition, classification and reporting of emergencies. To fully meet the intent of these orders, it is necessary that the Control Room Operators have a manual or guide for easy reference that addresses only the serious emergencies. The guide should enable quick recognition and emergency classification. It should specify corrective and protective actions. The Upset Response Manuals are not well designed for emergency use. They are too big and include too many nonemergency conditions.

CONCERN: See MC.5-5 and MC.7-1.

A.6 ENVIRONMENTAL IMPACT - PP.6

PERFORMANCE OBJECTIVE: The impact on the environs from the (routine) operation of the facility should be minimized.

FINDINGS:

- o Only saline water and crude oil pose a significant hazard to the environment. The small number of personnel do not create a significant sewage hazard threat to the environment.
- o Routine releases of oil are not made. Water to be released is measured for oil, and oil is separated from water prior to discharge.
- o The brine discharges to the Gulf of Mexico through the SPR brinelines are regulated by the Environmental Protection Agency (EPA) through the National Pollution Discharge Elimination System (NPDES). Each location has a separate permit and is considered on a case by case basis. The West Hackberry permit requires semi-annual integrity assurance testing of the pipeline; the Big Hill permit does not presently require testing for integrity, and such testing has not been performed since construction.
- o Oxygen scavenger use is monitored onsite downstream of the oxygen scavenger feed point, as required by the issued permits. The feed rate is adjusted to assure that some oxygen remains in the water discharged to the Gulf. Estimates are made of residual dissolved oxygen using an empirical relationship.
- o Onsite laboratory groups reporting to New Orleans, independent of the Site Manager, are responsible for environmental monitoring. Extensive records are kept. EPA and state regulatory agencies regularly review these records for compliance.

CONCERN: None.

B. PERSONNEL PROTECTION - OS and IH

A documented health and safety program is in place at SPR. The goal is to establish and maintain a safe and healthful work environment. The program has many positive components. Policies and procedures have been established, and an enforcement and assurance mechanism is in place. Hazard control efforts are in evidence, although not fully effective. With some noted exceptions, BPS and its subcontractors generally comply with BPS-established policy and procedures.

Deficiencies were noted in the program which reduce its effectiveness and preclude achievement of its goals. One deficiency in program execution is that many credible hazards have not been assessed. In addition, no effective program exists to identify crucial safety and health work activities and develop procedures for their safe conduct. Finally, many occupational hazards have not been identified and/or corrected in an expedient manner.

There is an inconsistency in the enforcement of site safety practices and procedures between BPS subcontractors and the DOE contractors. Site safety practices and procedures are being communicated to BPS subcontractors and compliance is effectively enforced. However, the same degree of enforcement does not apply to the DOE contractor.

The lack of a well-defined safety training program for SPR at each site is a significant deficiency in the health and safety program. The existing training program has not been standardized and it is not well controlled, tracked, or documented at all sites.

Individual sites have much autonomy in determining health and safety approaches, programs, and procedures. This appraisal has identified a disparity between the sites in the effectiveness of various aspects of the health and safety program. One site may excel in an area where another site is deficient, and vice versa. The effectiveness of the line control safety program is also diminished by training and procedural inadequacies. The New Orleans Safety Department has no program to compare site-specific approaches and standardize effective practices across all sites. An aggressive NOLA safety involvement in this review and standardization process is lacking. Critical self appraisals are not in evidence.

Overall, the personnel protection program has the elements in place to ensure a safe and healthful work environment but lacks full and consistent implementation. Fulfillment of this responsibility over the long term requires improvements in training; hazard evaluation and control; and detailed program reviews with standardization, where appropriate. The NOLA Safety Department needs to provide the leadership in this regard.

B.1 OCCUPATIONAL SAFETY

B.1.a DOCUMENTED PROGRAM - OS.1

PERFORMANCE OBJECTIVE: The occupational safety program should identify, evaluate, minimize, and control those activities that may have adverse impacts on the safety and health of the public and employees or have potential for accidental loss and damage to Government property.

FINDINGS:

- o Boeing Petroleum Service's (BPS) documented safety and health program is a composite of generic BPS "Operating Procedures" supplemented with numerous site specific "Operating Instructions", "Policies", and directives. These are required within BPS to cover the multi-faceted SPR operation.
- o The foregoing documents include and address work activities of both BPS and subcontractor employees.
- o Consolidation of these documents into functional binders and dissemination to operating employees for ready reference is the responsibility of individual sites.
- * Neither site has a single BPS standard safety manual containing all pertinent policy guidelines such as personal protective equipment requirements, hearing conservation, welding safety, work in confined spaces, etc.

CONCERN: See MC.7-1.

FINDINGS:

- o BPS safety and health program is implemented by means of direct line responsibility and control. The safety administrator is responsible for providing safety advice and assistance to the line supervisors, and is also charged with monitoring the Site Safety Program, evaluating its effectiveness, and recommending improvements.
- o The Site Safety Management Council meets monthly and is chaired by the Site Manager. This committee is assigned a major role in assuring the effective implementation of the Line Control Safety Program.
- o Safety monitors are selected and assigned within discrete work units on a rotating basis. Safety monitors are an integral part of the direct line Control Safety Program. The Safety Monitor Program is a means of training line personnel in site operating practices and also assists in the performance of the necessary function of work place hazard identification.

- o A Safety Monitors Handbook listing the responsibilities and duties of a safety monitor and identifying typical potential hazards, unsafe conditions and unsafe practices is distributed to safety monitors upon assignment. This handbook is designed to assist job performance of the safety monitor including his area inspection responsibilities.

- o A systematic means of identifying and tracking safety hazards is a part of the BPS occupational safety program.

- o Safety hazards are identified by means of a systematic program of audits and inspections, as well as employee reports and periodic inspections by the safety monitors.

- o Perceived hazards are referred to the Safety Management Council and discussed and acted upon (accepted or rejected) at monthly meetings. Special non-scheduled meetings are held when an immediate problem with a significant safety component arises.

- o Identified hazards that are abated or resolved within 30 days are dropped from further tracking. Hazards requiring more than 30 days to remedy are entered into the Hazard Abatement Tracking System (HATS). HATS items related to SPR are closed by DOE management when corrective actions are verified.

- * Recent HATS reports, which list all open identified hazards, reveal numerous hazards of 1981-82 vintage which are not yet resolved. Some of these items such as "validate set points on instruments and alarms" appear to be easily correctable, and there is no obvious reason for the long delay in resolution and closeout.

CONCERN: See MC.7-2.

B.1.b SURVEILLANCE OF ACTIVITIES - OS.2

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to maintain control of potential hazards to the public and employees and to minimize accidental losses and damage to Government property.

FINDINGS:

- o A formal system exists for reporting and investigating injuries, illnesses, and property accidents at the site. BPS is responsible for administration of injury/illness reporting for both BPS employees and BPS subcontractor employees.

- o Investigation and reporting of BPS employee injury/illness incidents is initiated by the site line supervisor.

- o A printed form, "Supervisors Report of Injury/Illness," is completed by the employee's immediate supervisor within 24 hours of notification of an occupational injury/illness and is submitted to the safety administrator within the same 24-hour period. This form serves as OSHA Form 101 and is also the base document from which other reports, such as Louisiana and Texas State Workman's Compensation forms and DOE Form 5484X, are prepared.

- o Subcontractor employee injury/illness accidents are investigated and reported to BPS, and ultimately DOE, by the subcontractor using the State of Louisiana or Texas "Employer's Report of Occupational Injury or Disease" form and the DOE Form 5484.X (prepared by BPS Safety). The Boeing Technical Representative (BTR) is responsible for assuring that all subcontractor accidents are promptly reported to BPS and documented.

- o Injury/illness investigations, including determination of causes and recommendations for corrective action, are handled by immediate line supervisors with consultation and assistance from the safety administrator as needed.

- o The safety administrator makes the determination of OSHA recordability for BPS employee incidents, consulting, if necessary, with the safety manager in New Orleans. The safety administrator also completes and maintains the OSHA 200 log. A spot audit of documents at each site indicated that BPS has available the applicable Department of Labor (DOL) recordkeeping guidelines and also their reporting procedures comply with DOL 29 CFR 1904.

- o First aid cases are logged in the first aid room and significant cases are followed with a "Supervisors Report of Injury/ Illness" maintained in the central files of the safety administrator.

- o A monthly Safety (statistical) Performance Report is prepared using incident injury/illness reports as the base data. This report, prepared in New Orleans, contains data from all operating units and includes injury/illness incidence rate comparison of performance among units. Trend data is prepared monthly by individual sites and yearly by New Orleans.

- o Surveillance of activities to maintain control of potential hazards is conducted by means of a formal program of audits and inspections. These include, annual audits conducted by BPS offsite professional safety personnel, annual audits by the site safety administrator, quarterly zone inspections by site management and monthly inspections by safety monitors. Each of these is documented.

- o Surveillance reports are transmitted to the Safety Management Council and discussed and acted upon at monthly meetings.

- o Weekly construction management safety walk-throughs are conducted and documented for each ongoing construction project. The safety administrator participates in some of these walk-throughs. Deficiencies noted regarding contractor operations are targeted for abatement via a written contractor notification procedure, "Notification of Non-Compliance (NON)."

- o The safety administrator also conducts frequent non-scheduled, undocumented site walk-throughs. A significant hazard observed would, however, be documented. The safety administrator is a member of the Safety Management Council and reports observed hazards at the next council meeting.

- o Senior BPS management make monthly visits to field sites on a rotating basis to conduct project review meetings. These meetings sometimes have a safety component. They also frequently participate in field safety functions such as award presentations when they occur. The do not conduct field inspections dedicated solely to safety because they perceive no need.

CONCERN: None.

B.1.c POLICIES, DIRECTIVES AND PROCEDURES - OS.3

PERFORMANCE OBJECTIVE: Official policies, directives and procedures should define the safety, health and quality assurance responsibilities and authorities, provide a statement of management participation and support, require compliance with DOE requirements and provide resources for overall program implementation.

FINDINGS:

- o Written policies, directives, and procedures covering, "recognized" potentially hazardous work operations exist and have been implemented to meet the requirements of DOE orders and the Occupational Safety and Health Act (OSHA) of 1970.

- o BPS has developed both generic and site specific operating procedures and guides to assure that operations are conducted in a safe and effective manner.

- o The Safe Work Permit System 220P-1 is the basic control mechanism intended to ensure that all hazardous conditions are recognized and that necessary precautions are taken before performing work that could possibly lead to personal injury or property damage. (See OP.2)

- o Workover rig operational safety is addressed by means of rig inspection check lists and specific written procedures for each well job. Specific well procedures include, as addenda, standard procedures for certain critical operations. Many of the individual procedures prepared for each well are safety related. Except for an emergency, changes determined necessary to approved specific well job procedures may be made only with the approval of the Site Contingency Review Committee.

- * Written operations procedures, many of which include a strong safety component, have been prepared for critical cavern storage and pumping operations such as; tank cleaning, line and vessel entry, pipeline pigging and recovery, lock out/tag out, vacuum truck operations, equipment start and stop operations, etc. Not all of these procedures, such as vacuum truck operations, are mandatory to all sites even though there is generic application.

- * A formal change (variance) authorization to operations manual procedures is documented at Big Hill but not West Hackberry. Field changes (when needed) are cleared verbally with the appropriate site department manager or his designee.

* An item not addressed by operating or maintenance procedures, which is considered potentially hazardous, is maintenance work on, or adjacent to, cathodically protected pipe lines in hazardous areas. A proper procedure will avoid the possibility of electrical sparking and possible ignition of hydrocarbon vapors.

* Many workover rig safety requirements, such as use and gauging of fracturing tank, parking of motor vehicles in relation to the well, location of; fracturing tank, crew change house, generator, etc., are not addressed in written guidelines. They are handled on a day-to-day verbal basis.

* A safe practices manual for workover operations addressing special workplace hazards, such as rig up safety, working and climbing at elevations, rig equipment safety requirements, spacing of ignition sources and other locations of equipment, well control, testing requirements, etc., is not available at BPS.

* There is no program to identify and evaluate all crucial safety operations and prepare, and periodically revise, written safe operating and maintenance procedures covering generic work activities at BPS.

CONCERN: See MC.1-1.

B.1.d MANAGEMENT CONTROL SYSTEMS - OS.4

PERFORMANCE OBJECTIVE: Management control systems should be in place to assure that occupational safety and health requirements are effectively carried out in the siting, design, procurement, construction, operation, maintenance, modification and decommissioning phases of the life cycle of a project or facility.

FINDINGS:

- o Management control systems are in place for assuring that industry safety and health practices are applied in the siting, design, and construction of storage facilities.

- o A design criteria document "Level III" has been prepared and promulgated by the DOE/NOLA for use by its contractors engaged in the design of new SPR facilities or the enhancement/upgrade of existing facilities. Level III, Revision A, dated March 1987, is the standard by which all new SPR facilities are designed and constructed and existing facilities are enhanced or upgraded. This document is referenced by BPS in document No. D506-01015-09, System Safety Program Plan.

- o Waivers or deviations from Level III criteria must receive written approval from the SPR Project Manager's office.

- o The Level III document contains minimum requirements for piping design and construction, pump station and meter pads, storage tanks, fire protection systems, etc.

- o Preconstruction reviews are specified and conducted at the 30, 75, and 100 percent design stages to assure conformance with established criteria. The identification and control of hazards affecting safety and health is an essential part of these reviews. Site personnel including the safety administrator participate in these reviews through meetings or routings of draft specifications and drawings.

- o Level III criteria specify that the crude oil pipeline design shall meet the requirements of Title 49, Code of Federal Regulations (49CFR195) Part 195, and the American National Standards Institute Code for Liquid Petroleum Transportation Piping systems (ANSI B31.4). Raw water and brine disposal pipelines shall meet the requirements of ANSI B31.4.

- * The design criteria for determining pipeline wall thickness using either Department of Transportation (DOT) 49CFR195 or ANSI B31.4 permit a stress value of 72 percent (1.39 safety factor) of the minimum yield strength of the pipe material. Where an increased risk exists, such as on an offshore or inland platform in navigable waters, DOT 49CFR195 further specifies use of a design factor of 0.60. Level III criteria

for SPR constructions do not specify an increase in wall thickness and strength above the 0.72 level to account for added hazards and exposures that may be present at major river or water crossings or for onsite hydrocarbon piping systems. Likewise, DOE/NOLA - BPS standard piping design specification do not require upgrade above Level III for either onsite or offsite hydrocarbon piping. The Level III - ANSI B31.4 standard does, however, specify that individual consideration for more stringent criteria be given to water crossing designs to account for special problems that may exist. This is done by BPS.

* ANSI B31.4 and DOT 49CFR195 and hence Level III criteria permit radiographic inspection of a minimum of 10 percent of the girth welds of hydrocarbon pressure piping throughout the facility area including the crude oil injection pump pad piping. In practice, however, 100 percent of hydrocarbon onsite piping girth wells are radiographed because the Standard Welding Specification No. 15051, issued by DOE and used by BPS, specifies this level of Non Destructive Testing (NDT).

* Level III criteria permit the use of single, as distinct from dual, mechanical seals in the high pressure hydrocarbon pumps. This permits pressure discharge of hydrocarbons into the immediate hazardous area if the seal fails.

* The slop oil tanks (7000 barrels at West Hackberry and 250 barrels at Big Hill) are not protected from explosion by either a gas blanket or nitrogen inerting. Inadvertent ignition, such as may be caused by lightning, could result in an internal explosion should the tanks contain hydrocarbon vapors in the explosive range. Level III criteria do not address hazards of this nature. Fracturing tanks (enclosed portable storage tanks - approximately 250 barrels capacity) used on well sites during workover operations have similar hazards.

CONCERN: (OS.4-1) (H1/C3)

DOE Level III criteria do not account for nor address some hazards specific to liquid hydrocarbon transportation and storage at West Hackberry and Big Hill (i.e.: specific situations where more stringent criteria and standards are to be considered).

B.1.e IDENTIFICATION AND CONTROL OF HAZARDS - OS.5

PERFORMANCE OBJECTIVE: The Occupational Safety Program should assure prompt identification, evaluation, and control of safety hazards in the workplace and readily accommodate changing circumstances.

FINDINGS:

* A documented safety program is in place and routinely implemented, but is not fully effective for controlling safety hazards consistent with the risk and hazard potential that exists.

- o Major components of the hazard control safety program are the safe work permit system; the formal inspection and audit program; formal meetings and actions of the Site Safety Management Council; and available written work procedures for many critical operations.
- o The availability and use of Level III criteria for the design and evaluation of site facilities also minimizes some workplace hazards.
- o A comprehensive preventive maintenance program exists for alarm and shutdown controls, instrument calibration, machinery, hoisting and rigging devices, etc.
- o Safety equipment such as respirators, life belts, gas detectors, etc. are systematically maintained and controlled.
- o Walking-working surfaces, guardrails, and ladders generally meet OSHA requirements throughout the sites.
- o Site personal protective equipment policy was observed to be uniformly followed.

* With few exceptions (i.e., adjacent to the slop oil tank at West Hackberry and at the raw water injection pad at Big Hill), housekeeping is good.

* The storage loft above the tool room at Big Hill was not posted with an approved floor loading as required by OSHA. Bolted steel material storage racks inside the warehouse buildings were also not posted with load limiting data.

* Exposed bare electrical wiring was noted in several instances at both sites. Although these wires may have been deenergized and locked out, the possibility of system failure should not be discounted.

* The electric control panel activating the hydraulic pipeline valves in some cavern pads at Big Hill is a safety hazard because it is located so that during wet weather the operator must stand in water to push the on/off buttons.

* Crude oil and brine pump motor cases at Big Hill are not all externally bonded to base and ground systems except through foundation shim plates. This could result in personal injury from electric shock.

* Stored acetylene and oxygen cylinders in the Big Hill procurement yard were not separated by 20 feet as required by OSHA.

CONCERN: See IH.2-1.

B.1.f COMMUNICATION OF HAZARDS TO EMPLOYEES - OS.6

PERFORMANCE OBJECTIVE: Facility personnel should be adequately informed of safety hazards they may encounter in their work environment.

FINDINGS:

- o Safety meetings are the primary means of communicating newly recognized or experienced safety hazards or problems to all persons on the facility.
- o Safety meetings are routinely held for all site personnel, on a monthly basis for BPS employees, and weekly for subcontract employees. Meetings are documented.
- o The BPS meeting leader is normally the unit shift supervisor. Meeting topics are selected by the shift supervisor or his functional manager. Some meeting topics are directed by the Site Safety Management Council in response to a recognized need.
- o Senior site supervisors (managers) occasionally monitor and encourage quality unit safety meetings with their attendance.
- o On request, the safety administrator will obtain and provide literature and training aids to enhance the effectiveness of meetings.
- o The Government Industry Data Exchange Program (GIDEP) safety alert reporting system is used by BPS and circulated to all sites on an applicable basis even though they are seldom pertinent to SPR operations.
- o Occupational safety statistics, OSHA information and employee safety rights and obligations are posted at the facility.
- * BPS does not have a program to periodically compile and communicate to all site employees the details and lessons to be learned from accidents or near misses that occur both on site and throughout the SPR facilities.

CONCERN: See TS.2-1.

- o Indoctrination training, with a significant safety component, is given all new BPS employees and all subcontractor employees new to the site.
- o Line supervisors at each site are given a special safety training course. This course includes guidance on hazards recognition and correction, accident/incident reporting and OSHA compliance. The plans are to repeat this course on 2 to 3 year intervals.

- o Boeing Technical Representatives (BTRs), the persons responsible for overseeing subcontractor safety, have been given special safety training with concentration on OSHA regulations, personal protection equipment, and the recognition and evaluation of construction hazards.

- o Boat operators are given special training in boat operation and navigation.

- o A safety motivation program is in place to increase safety awareness and recognize and encourage outstanding safety performance in attaining accident and injury-free records commensurate with company goals. At the site level the program is administered by the Site Safety Management Council. Field employee eligibility for a Safety Performance Award is based on working a calendar year without a recordable injury/illness incident or a company vehicle accident. A personal vehicle accident on site will also disqualify an award recipient.

- o Personnel at both sites said that they were encouraged to bring safety problems forward.

CONCERN: None.

B.2 INDUSTRIAL HYGIENE

B.2.a DOCUMENTED PROGRAM - IH.1

PERFORMANCE OBJECTIVE: The industrial hygiene program should identify, evaluate, minimize, and control those activities that may have adverse impacts on the health of the public and employees or have potential for accidental loss and damage to Government property.

FINDINGS:

- The BPS SPR industrial hygiene program is documented in the BPS Operating Procedures (OP) Manual, Section 12. This BPS OP Manual represents a working industrial hygiene document for all SPR sites. Operating procedures address areas of management surveillance, inspection and control, personal protection, subcontractors, health complaints, appraisals, hazard communication, and radiation safety.

- In addition to Section 12 of the BPS OP Manual, other OP's provide guidelines for certain hazardous operations or address support issues such as subcontractor surveillance, Safe Work Permits, handling of asbestos gaskets, health examination, training, orientation, and tank cleaning.

- The sites have the authority to prepare site specific operating instructions or procedures. Big Hill has assembled a "Site Specific Procedures Manual" which includes a "Safety and Health Policy" document and various other procedures with safe operating instructions.

- Both sites have a respiratory protection program and a hearing protection requirement; however, approaches, content, and effectiveness differ substantially between the sites.

- A generic BPS "Employee Safety Handbook" provides a program summary of BPS health and safety and operating procedures for BPS employees and BPS subcontractors.

- The documented program requires a series of inspections, audits, and other surveillance activities to be performed.

- Chemical inventory listings and most Material Safety Data Sheets (MSDS) are maintained. The safety administrators approve purchase orders when Quality Assurance requires their review based on established purchase requisition guidelines.

- Air and noise monitoring is the responsibility of the New Orleans industrial hygienist who provides written evaluations concerning workplace monitoring and controls to the site

manager and site safety administrator. Line supervisors are made aware of report results through the Safety Management Council meetings.

* Hazard controls are in evidence for some operations and include engineering controls and respiratory protection. New Orleans Systems Safety considers chemical hazards in the selection process for operating systems.

* Industrial hygiene training requirements are left to the discretion of each site. No standardized industrial hygiene training program or course content requirements are in place across all SPR sites. Course topics, content, and effectiveness, therefore, vary from site to site.

* No chemical/physical hazard exposure monitoring program plan has been developed. A complete health hazards inventory is not maintained. The above apply to both sites.

CONCERN: See MC.7-1

B.2.b SURVEILLANCE OF ACTIVITIES - IH.2

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to maintain control of potential hazards to the public and employees and to minimize accidental losses and damage to Government property.

FINDINGS:

- o A construction health and safety surveillance program is in place for BPS subcontractors. The program is administered by the Construction Management Department. The appropriate Boeing Technical Representative (BTR) is responsible for subcontractor performance. The program is supported by the safety administrator. Pre-award and pre-construction safety reviews are held where both subcontractor and BPS safety related issues and submittals are addressed. The BTR conducts and documents weekly contractor safety inspections. Safe Work Permits (SWP) are issued daily defining general safety and other requirements.

- o Effective communication, surveillance, and enforcement of basic elements of health and safety practices are evidenced at both sites by widespread compliance with routine policy and procedure such as hard hat, SWP, eye protection, and hearing protection requirements.

- * A surveillance program is not conducted by onsite BPS BTRs for DOE/NOLA prime contractors. This surveillance is the responsibility of DOE/NOLA and the contractor's safety representative. Contractors responsible directly to DOE/NOLA were in lesser compliance with site policy and procedure as evidenced by (1) failure to wear goggles during concrete pouring and (2) failure to secure compressed gas cylinders at West Hackberry.

CONCERN: See MC.1-4.

FINDINGS:

- * Regular inspections and reports are conducted for each area by the appropriate safety monitor. At West Hackberry, a monthly inspection is conducted. At Big Hill, reports are generated as deficiencies are found; therefore, reports could be frequent or infrequent. These reports are to be submitted, reviewed, and documented as part of the monthly Safety Management Council meeting (see IH.4). A review of West Hackberry meeting records from June 1988 through October 1988 showed incomplete submittal of these reports as follows. Maintenance and Operations departments generally made submittals, but not in all cases. No submittals were seen for the Property Management, Workover, and Construction Management departments. A review of Big Hill records from July through December 1988, showed that the Operations Department made submittals in 5 of 6 months and the Maintenance Department

made submittals in 4 of 6 months. No submittals were made in August. No submittals were made by the Property, Cavern Engineering, and Construction Management departments.

CONCERN: See IH.4-1.

FINDINGS:

- o Health hazard evaluation is performed through the conduct of (1) an independent annual health and safety audit by safety personnel from other SPR sites; (2) an annual health and safety audit by site personnel; (3) quarterly zone inspections by site management; (4) regular safety monitor inspections; (5) weekly construction management inspections; (6) regular walkthrough spot checks by the safety administrator; and (7) periodic field monitoring and assessment by the New Orleans industrial hygienist.

- * The two annual audits have been performed and reports have been generated for both sites. Deficiencies are identified in the reports. However, at the time of this appraisal, certain technical issues (such as the deficiencies in the West Hackberry respiratory protection program and lack of medical monitoring at Big Hill) have not been corrected.

- * In July 1988, an "Industrial Hygiene Audit of Boeing Petroleum Services" was conducted by a Boeing corporate industrial hygienist. Approximately 6-8 hours were spent at each site. The audit used a checklist system to assess hazard communication, hearing conservation, and respiratory protection. The audit was not of sufficient depth to uncover some of the deficiencies found during this appraisal. For instance, the Boeing audit found that "no significant respirator program deficiencies were identified at any of the sites." In addition, the audit noted that medical monitoring for respirator use was performed at Big Hill. These Boeing findings are contradicted by the findings of this appraisal.

CONCERN: See MC.5-4.

FINDINGS:

- * Exposure monitoring for air contaminants and noise is performed by the New Orleans industrial hygienist. No onsite capability for exposure monitoring exists except for certain point-in-time devices and radiation dosimeters/monitors. Since 1985, the following have been performed at West Hackberry: (1) three noise monitoring studies; and (2) an asbestos exposure monitoring study in August 1985. At Big Hill, two noise monitoring surveys were performed. No chemical exposure monitoring has been performed.

- o Noise monitoring has included both personal dosimetry and area sound level monitoring. Monitoring was thorough, well compiled, and reported.

* The 1985 West Hackberry asbestos monitoring was conducted for warehouse gasket handling/storage and gasket replacement operations. The monitoring was conducted prior to the 1986 reduction in the OSHA Permissible Exposure Limit (PEL) from 2 fibers per cubic centimeter (f/cc) to 0.2 f/cc. Warehouse operations showed fiber exposure up to 1.1 f/cc which was below the OSHA PEL at the time, but which far exceeds the current standard. Although asbestos gaskets remained in the West Hackberry warehouse until mid-1987 and in the Big Hill warehouse until January 1989, no follow-up monitoring was performed to assure the effectiveness of procedural controls to reduce exposure.

* Welding, grinding, sandblasting, and painting operations are widespread and involve the potential for credible occupational respiratory exposures. No exposure monitoring has been performed for these operations. See IH.5 for details.

CONCERN: (IH.2-1) (H2/C1) Many safety and health hazards have not been identified, quantified, evaluated, and corrected in an expedient manner.

B.2.c POLICIES, DIRECTIVES AND PROCEDURES - IH.3

PERFORMANCE OBJECTIVE: Official policies, directives, and procedures should define the safety, health, and quality assurance responsibilities and authorities; provide a statement of management participation and support; require compliance with DOE requirements; and provide resources for overall program implementation.

FINDINGS:

- o The BPS corporate policy regarding health and safety has been established through policy statements from management which are also found in the BPS OP Manual. Policy statements have been made for the Safety Program (12A2), and Occupational Health, Safety, and Accident Prevention (12A1). BPS policy is to comply with DOE 5480.1, 5481.1, 5482.1, and 5484.1.

- o Project Directives (PD) are issued by New Orleans BPS to address safety and health and other issues. As examples, PD's have been issued to assess "Hazardous Metals in Paints", and "Radiation Safety Enhancement". The former is in process; the latter has been closed out.

- * No written operating procedure (OP) or formal program exists for noise/hearing conservation, although some elements of hearing conservation are applied, such as annual audiographics for certain employees. Noise surveys have been performed at both sites. At West Hackberry, personal dosimetry showed some time weighted average (TWA) exposures to be in excess of 85 dBA which would trigger the OSHA Occupational Noise Exposure Standard 29 CFR 1910.95. TWA exposures above 85 dBA are for intermittent operations only. At Big Hill, TWA exposures measured in December 1988, were 84.3 dBA and 84.9 dBA. At both sites, area monitoring shows certain areas (e.g, high pressure pump pad [HPPP] and low pressure pump pad [LPPP]) to be in the 90 dBA to 100 dBA range. These results border the exposure criteria which would require a formal hearing conservation program.

- * A hearing protection recommendation for West Hackberry was provided by the New Orleans industrial hygienist in the survey report of September 4, 1985. It states that "In instances where the operators are required to remain in the HPPP or LPPP areas for more than their hourly meter readings, hearing protection shall be required." This recommendation is not clearly defined and therefore difficult to enforce.

- * A hearing protection requirement for Big Hill was provided in the safety administrator's Sound Level Survey Report of September 29, 1987. It states that "... hearing protection will be required ... for all personnel entering and working in these areas." This requirement is clear and enforceable.

* Other procedures and programs, such as the respiratory protection program and industrial hygiene training program are also inconsistent across the sites. No effort has been made to standardize these programs, and some are significantly more effective than others.

CONCERN: (IH.3-1) (H2/C1) Program and procedural requirements vary from site to site in content and effectiveness, and no practice is in evidence to evaluate and standardize effective approaches SPR-wide.

FINDINGS:

* No written requirement for the use of safety glasses exists at West Hackberry. The requirement was stated to be that goggles are mandatory for welding, grinding, and pouring concrete. No requirement for safety glasses in the laboratory has been established and no postings are present. Big Hill has a site specific procedure for "Use of Safety Eyewear in the Big Hill Laboratory" which became effective December 21, 1988.

* Industrial hygiene training requirements have not been standardized and are left to the discretion of each site.

* Training programs are not well documented at West Hackberry. No central file exists for training within departments, with the safety administrator, or with management. Some evidence of training conducted during safety meetings was found in department manuals; however, records were dispersed, incomplete, and not readily retrievable. Training outlines defining course content were not apparent. The extent, regularity, and completeness of training, therefore, cannot be determined.

o At Big Hill, training is documented in department personnel files on a "Training Requirements" form. The safety administrator and lead clerk also maintain a listing of people who have been trained in various topics. A computerized list is being prepared at Big Hill.

* Neither site maintains a check system to assure that all people have received the required training courses.

CONCERN: See MC.6-2.

FINDINGS:

o Responsibilities of the various positions and departments relative to health and safety functions are delineated in Management Surveillance of the Safety Program (120P-1), Line Control Safety Program (120P-2), and other individual OPs. Line supervisors and managers are responsible for program administration and enforcement. The safety administrator is responsible for technical assurance and support.

- The site safety administrators at Big Hill and West Hackberry and the New Orleans industrial hygienist are qualified in their respective disciplines. Potential occupational health problems are identified by the site safety administrators and regular consultation takes place with the New Orleans industrial hygienist by telephone. The New Orleans industrial hygienist is at each site approximately 3 to 6 times per year for 1 to 3 day periods.

- Until January 1989, the industrial hygienist had several non-industrial hygiene duties requiring one-third time. This has now been changed and 100% time is allocated for industrial hygiene.

- Violations of safety procedures are reported to the violator and appropriate BPS supervisor by the safety administrator and/or line supervisors verbally and through written deficiency reports, safety surveillance reports, and written correction requests depending on the severity and regularity of deficiencies. Written communications require a formal response by the recipient.

- The site safety administrator provides weekly reports to the New Orleans safety manager. Content includes problems/concerns, activities conducted, observations, 2-week plans, and accidents/incidents.

- The New Orleans industrial hygienist prepares reports concerning formal audits or monitoring studies. These are forwarded to the site manager, New Orleans safety manager, and site safety administrator, among others. No written reports are generated for routine visits and walkthroughs/inspections unless deficiencies are discovered.

- The Big Hill safety administrator prepares "position papers" recommending safety policy and procedure. These position papers are submitted to the appropriate department managers, site manager, and New Orleans industrial hygienist. The position can be adopted by written or verbal directive at the Safety Management Council meetings or can be implemented by the department on its own initiative.

CONCERN: None.

B.2.d MANAGEMENT CONTROL SYSTEMS - IH.4

PERFORMANCE OBJECTIVE: Management control systems should be in place to assure that industrial hygiene safety and health requirements are effectively carried out in the siting, design, procurement, construction, operation, maintenance, modification, and decommissioning phases of the life cycle of a project or facility.

FINDINGS:

* The individual sites have significant autonomy in the administration and conduct of the health and safety program, inclusive of establishing programs, procedures, and approaches so long as they are not in direct conflict with the BPS OP Manual. This autonomy has resulted in disparity between the sites relative to basic health and safety procedures and practices. The New Orleans Safety Department does not have a program to compare site-specific procedures and practices and standardize effective ones, where appropriate.

CONCERN: See MC.1-1.

FINDINGS

* BPS 12OP-1 and BPS 12OP-2 establish procedures for "Management of the Safety Program" and the "Line Control Safety Program". According to procedure, the site managers appoint a site Safety Management Council to manage the line control safety program. In practice, the Council only advises the site manager who chairs the Council and has ultimate site authority. This disparity could cause some confusion concerning lines of responsibility and accountability. Safety Management Councils at both sites meet monthly as dictated by procedure. The Council consists of the site manager, and operational department representatives, among others. The site safety administrators attend the monthly meetings and are Council secretaries.

* Management is made aware of safety and health issues through the monthly area inspection report from the departmental safety monitors. These reports are discussed in the monthly Council meetings. A review of the Council meeting reports indicate that monthly meetings are held; however, safety monitor inspection reports are not always submitted.

* The line control safety program at West Hackberry has noted deficiencies relating to industrial hygiene such as inadequate training records, and a poorly administered respiratory protection program. The extent of deficiencies varies markedly by department.

CONCERN: (IH.4-1) (H2/C2) The management surveillance and line control safety programs are not being administered consistently or

effectively by all departments within specific sites, and do not adequately serve to identify safety and health hazards and program deficiencies.

FINDINGS:

- o Big Hill has developed a Line Control Safety Program Manual and training program that is provided to the supervisors by the safety administrator.

- o Chemical hazards are considered by BPS in the decisionmaking process for the design of operating systems. As an example, BPS was able to use a less hazardous system as a result of their technical analysis. Walk-Haydel proposed the use of a sulfur dioxide and anhydrous ammonia system for oxygen scavenging at Big Hill. The system was proposed instead of ammonium bisulfite based on a favorable cost analysis prepared by Walk-Haydel. BPS objected to the use of the extremely hazardous sulfur dioxide and ammonia and prepared a risk analysis as well as a cost analysis which factored in more intense safety and environmental considerations into projected operating cost. BPS Systems Safety led the effort and was supported by the Safety and Environmental departments. DOE concurred with the BPS analysis and the less hazardous ammonium bisulfite system was approved over the sulfur dioxide/ammonia system.

CONCERN: None.

B.2.e IDENTIFICATION AND CONTROL OF HAZARDS - IH.5

PERFORMANCE OBJECTIVE: The Industrial Hygiene Program should assure prompt identification, evaluation, and control of chemical, physical, and/or other environmental stresses in the workplace and readily accommodate changing circumstances.

FINDINGS:

- o The potential for credible occupational exposures exists for noise, asbestos, confined spaces, radiation, and chemical agents. Potential chemical exposures are greatest for welding operations (metal fumes), painting operations (solvents, di-isocyanates and pigments), sandblasting/grinding operations (metals, silica), and site-wide pesticide applications (malathion).

- o Hazard identification, monitoring, and field inspections are performed as addressed in IH.1 and IH.2. Exposure monitoring is not performed routinely and has not addressed all significant hazard potentials.

- o Respiratory protection is used to a significant extent at both sites to control personal exposure to airborne hazards.

- o A written, respiratory protection program entitled "Respiratory Protection Guide" is in place at both sites. The guide addresses respiratory protection policy, location of respiratory protection equipment, jobs requiring respiratory protection, recordkeeping forms, respirator information sheets, OSHA regulations, and equipment manuals.

- * Respiratory protection procedures in use differ from the specifications in the Respiratory Protection Guide. Examples include: (1) a supplied air (compressor) hood type respirator is used for sandblasting (this respirator is appropriate) rather than the self-contained breathing apparatus (SCBA) specified in the Guide; (2) pesticide canisters are used for pesticide application as they should be; however, organic vapor respirators are specified in the Guide; (3) welding and cutting operations are not performed with air supplied respirators even though they are called for in the Guide.

- * The policy on wearing a beard is contradictory as stated in the Respiratory Protection Guide. Section 1 states that employees with beards must only demonstrate a proper seal (fit test). Section 4, "Qualitative Fit Testing" clearly states that persons wearing a beard (or other interfering facial hair) "shall not wear a respirator" (negative pressure type). In fact, persons with beards are allowed to wear negative

pressure respirators as evidenced by two painters (Maintenance Department) at West Hackberry with beards, wearing respirators, and painting.

* Section 2 of the Respiratory Protection Guide is blank. No guidelines for oxygen scavenging or asbestos respirators are provided in Section 3.

* Big Hill has improved upon the Respiratory Protection Guide by preparing a site specific "Respiratory Protection Procedure" dated January 6, 1989. This procedure is well written and defines specific operations requiring respiratory protection and the specific types of respirators to be used. The procedure permits the wearing of facial hair if a proper seal (fit test) can be obtained. If a proper seal cannot be demonstrated, the obstruction must be removed.

* The team observed that the incorrect respiratory canister was issued for use in a tank cleaning operation. The procedure did not specify the type canister to be used, and site personnel lacked the technical safety knowledge to determine the correct canister to be used. BPS took immediate action to modify the procedure to correctly specify the correct canister.

* At both sites, personnel are fit tested for respirators with isoamyl acetate whether or not a beard is worn. Use of this substance in a fit test cannot assure a successful fit since the wearer has no obvious discomfort if the agent is perceived. However, use of irritant smoke would trigger an immediate and obvious reaction from the wearer should the fit fail.

* Fit tests are performed only annually for employees whether or not a beard is worn; even though, changes in beard style and growth can result in an improper fit.

* Fit test records are kept by the individual departments at West Hackberry. Workover had no records and did not know what a fit test was. Maintenance had records for five employees; however, they were incomplete regarding respirator type. Operations had records for a December 1988 fit test; however, no identification as to type of air purifying respirator was listed.

* Fit tests at Big Hill are performed and records are kept by the tool room attendant. Records are well maintained and respirators are not issued unless a current fit test record is on file. However, no medical records are available to the attendant to verify that personnel are physically able to wear a respirator. (See Section IH.7)

* Line supervisors administered the respirator program at West Hackberry. It was apparent that the line supervisors responsible for respirator issuance and personnel using respirators did not have the basic training required for a successful program. Maintenance was unsure of which respirators were used for asbestos gasket change out or pesticide applications. Workover personnel used disposable respirators for painting which had not been changed for two years and were not properly stored.

o At Big Hill, the respirator program is administered by one person, the tool room attendant. He keeps and maintains all respirators and related equipment. He issues respirators to employees as required, tracks their usage and return, and assures a good state of repair. Equipment is well organized and the program is effectively administered.

* At West Hackberry, few records for respirator training of employees could be located. Respirators were permanently issued to each person, and each individual was responsible for upkeep. At West Hackberry, Workover employees did not know of basic respirator care practices or usage procedures. However, the Maintenance Department painters (despite wearing of beards) did properly use, store, and care for their respirators.

* The West Hackberry compressor system supplying the hooded respirator for sandblasting uses a pneumatically powered air pump which is capable of delivering grade D air. However, the system has no maintenance record and its air has never been tested for quality. The Big Hill compressor is diesel powered and its supply outlet is labelled "not suitable for human consumption". To achieve grade D quality breathing air, the air is filtered through a combination filter to remove oil, condensed water, particulates, odors, and organic vapors. The air supply has never been tested for quality.

* The OSHA Respiratory Protection Standard 29 CFR 1910.134 (b) (9) requires that "there shall be a regular inspection and evaluation to determine the effectiveness of the program". Based on the above deficiencies, the New Orleans Safety Department is not fulfilling this requirement. No effort has been made to standardize an effective program across all sites.

CONCERN: (IH.5-1) (H2/C1)

The Respiratory Protection Program is not adequately administered at all sites, is not adequately supported by the New Orleans BPS Safety Department, and is not uniformly in compliance with OSHA 29 CFR 1910.134.

FINDINGS:

* Welding operations are conducted regularly at many site locations. Most are performed in open air, although some are conducted in excavated areas. Galvanized welding is also performed. Grinding and welding of painted surfaces (possibly with lead or chromium) may also occur. These operations have not been monitored.

* Sandblasting operations (involving silica and metal pigments) occur regularly. An air supplied respirator with hood (protection factor of 25) is used. No monitoring of this operation (inside or outside of the hood) has been performed.

* Painting also occurs regularly involving various solvents and metal pigments (some containing lead, chromium and other toxic metals). No monitoring of this operation has been performed.

* A Project Directive was issued in May, 1988 to assess the presence of "Hazardous Metals in Paints." Engineering Design is tasked to identify existing lead paint areas and paint systems, and to revise paint specifications, if necessary, to reduce risk. Environmental and Safety Departments will provide monitoring and analytical support. The assessment is scheduled to begin in late FY 1989 and is scheduled for completion in late FY 1990.

CONCERN:

See IH.2-1.

FINDINGS:

* Asbestos gaskets are in place in some well pad piping at both sites. Change out of these gaskets is addressed in Handling of Asbestos-Filled Gaskets (220P-3). This procedure has not been maintained current with OSHA 29 CFR 1910.1001, Asbestos. Examples include (1) a "Caution" rather than "Danger" sign is specified; (2) disposable masks which are no longer allowed are specified by the OP; and (3) a 10 f/cc airborne concentration is the alert level in the OP which is well above the current OSHA PEL of 0.2 f/cc.

* In addition, the procedure does not specify any personal protection for maintenance workers removing gaskets, but does require "masks" for property personnel.

* Asbestos gaskets are no longer stocked at either site. These items have been phased out (mid 1987 at West Hackberry and January 1989 at Big Hill). However, gaskets do still exist at both sites in various piping systems. These gaskets are periodically replaced with non-asbestos gaskets as they become defective. Discussions with the West Hackberry Maintenance Department indicated that no special handling procedures are followed in most cases except for wetting and bagging. Until recently informed by Walk-Haydel, Big Hill did not know which areas have asbestos gaskets; therefore, precautions have not

areas have asbestos gaskets; therefore, precautions have not been taken to date. The operation has not been monitored since the OSHA PEL was lowered to 0.2 f/cc in 1986. The operation is considered to be a low exposure potential by the Safety Department.

CONCERN: See MC.1-3 and MC.5-2.

FINDINGS:

- Controls and procedures for a well logging operation were observed at West Hackberry which involved use of a 112 microcuries (mCi) Cobalt 60 source for an interface survey. Required procedures are delineated in Radiation Safety for Subcontracted Services (12OP-21) as modified by the November 15, 1988, clarification memo. The BPS BTR properly performed the requirements of this OP.

- Controls to assure a safely performed tank cleaning operation were reviewed with the Big Hill Construction Management BTR. The cleaning operation was performed several months ago on the surge tank by a subcontractor. The file was well maintained. Documentation of proper controls (e.g., air monitoring, safety equipment, inspections, etc.) was in evidence.

- The health and safety program does consider engineering controls to reduce exposure potential to occupational hazards. Engineering controls have included: (1) moving the HPPP operator booth out of a high noise area at West Hackberry; (2) redesigning the West Hackberry oxygen scavenging unit; and (3) installation of local exhaust ventilation for the Big Hill maintenance shop welding area.

CONCERN: None.

B.2.f COMMUNICATION OF HAZARDS TO EMPLOYEES - IH.6

PERFORMANCE OBJECTIVE: Facility personnel should be adequately informed of chemical, physical, and biological stresses they may encounter in their work environment.

FINDINGS:

- o The BPS OP Manual has a written OP for a "Hazard Communication Program" (120P-16). The written program complies with the requirements of the OSHA Hazard Communication Program (29 CFR, 1910.1200). It is applied at both sites.

- * At both sites, notebooks of Material Safety Data Sheets (MSDS) are maintained with the safety administrator, Property, Laboratory, Operations, Maintenance, and other departments. Big Hill maintains a master list in the library. A chemical listing index is available although it may be incomplete at West Hackberry. Big Hill has computerized its list. At West Hackberry, MSDS were not well organized in some areas such as the laboratory. Difficulty in quickly retrieving MSDS was observed in the West Hackberry Property Department. West Hackberry painters had MSDS available at the job site for the paint being used. Some MSDS were not available at both sites due to difficulty in receiving MSDS for GSA-supplied products.

- o Most chemical products are maintained in small quantities. Bulk chemicals are limited to sandblasting agents, ammonium bisulfite (oxygen scavenger), fuel and lubricating oils, and antifreeze. Significant stocks of paints and pesticides are also maintained.

- * Chemical storage in the West Hackberry property yard is in a posted, isolated building with good ventilation. Warning signs are apparent. The area is neat and orderly. Laboratory storage of chemicals is also well managed, neat, and orderly. Solvent cabinets are available, utilized, and marked. The maintenance lay down yard was the only place noted with mislabeling. "Hydraulic fluid" drums in this area were used for gasoline storage and were in close proximity to a welding bench.

- * Chemical stocks at Big Hill were not well organized by the Property Department. No central storage building was available. The Property Manager did not realize his department stored chemicals despite the presence of 165 gallons of malathion, 55 gallons of bisulfite, and many small quantity containers of solvents, pesticides, cleaners, disinfectants, etc. Paints were stored at Big Hill by the Maintenance Department in a shed marked for flammable storage.

The area was neat and orderly. The only mislabeling noted at Big Hill was an unmarked 55 gallon drum of ammonium bisulfite in the property lay down yard.

* Well pads were posted for H_2S and restricted entry at both sites. The slop oil tank was not posted for H_2S at West Hackberry despite its possible presence. H_2S posting was present at the Big Hill surge tank.

o The radiation work areas observed at both sites were posted.

* No postings were seen at West Hackberry for noise hazards; however, Big Hill noise areas were posted in most cases. No "Danger" signs were noted at either site for use during asbestos gasket operations or for marking asbestos disposal bags. No "Eye Protection Required" postings were observed at West Hackberry.

o BPS subcontractors are alerted to safety requirements during pre-award and pre-construction briefings. Communication is apparent based on good BPS subcontractor adherence to safety policy and procedure, and based on BPS BTR subcontractor records.

* Health and safety training requirements are determined by the Safety Management Council. Line supervisors are then responsible for arranging the training session. The safety administrator is available for support and assures training is conducted. Relative to occupational health, the following training is reportedly provided: (1) respiratory protection; (2) H_2S; (3) hazard communication; and (4) radiation. Standardized courses have not been prepared.

* No training has been provided for asbestos handling at either site.

CONCERN: See MC.6-2.

FINDINGS: * No special communication, notification, or training has been provided to alert supervisors and workers to hazards associated with lead based paints relative to painting, sandblasting, grinding, and welding. The extent of lead based paint usage and presence is not currently known by site management or the Safety Department, but is under study.

CONCERN: See IH.2-1.

B.2.g INDUSTRIAL HYGIENE PROGRAM CONTENT - IH.7

PERFORMANCE OBJECTIVE: The industrial hygiene program should minimize the probability of employee illness, impaired health or significant discomfort by identifying, evaluating and controlling those stresses arising in the work place.

FINDINGS:

- The written industrial hygiene/occupational health procedures are defined in the BPS Operating Procedures (OP) Manual, Section 12. OPs pertinent to industrial hygiene include:
  - (1) Management Surveillance of the Safety Program (12OP-1)
  - (2) Line Control Safety Program (12OP-2)
  - (3) Inspection and Hazard Abatement (12OP-5)
  - (4) Industrial Hygiene Program (12OP-6)
  - (5) Personal Protective Equipment (12OP-7)
  - (6) Occupational Safety and Health Complaints (12OP-8)
  - (7) Subcontractor Safety (12OP-9)
  - (8) Safety and Health Appraisal Program (12OP-12)
  - (9) Hazard Communication Program (12OP-16)
  - (10) Radiation Safety for Nuclear Density Gauges and Detectors (12OP-20)
  - (11) Radiation Safety for Subcontracted Services (12OP-21)
- The industrial hygiene/occupational health procedures are supplemented by procedures for operational departments concerning particular hazards. The following OPs are of importance:
  - (1) Crude Oil Tank Preparation and Cleaning Operations (22OP-44)
  - (2) Safe Work Permits (22OP-1)
  - (3) Handling of Asbestos-Filled Gaskets (22OP-3)
  - (4) Occupational Health and Health Assessment Examinations (8OP-5).
- The "Inspection and Hazard Abatement" (12OP-5) procedure establishes semi-annual safety inspections.

* The "Industrial Hygiene Program" (120P-6) establishes the procedure for assessing and controlling work place hazards related to chemical, biological, physical, and ergonomic stresses. This procedure is not site-specific and contains no detail regarding monitoring, assessment, or control requirements other than general statements.

* The Personal Protective Equipment procedure (120P-7) also contains no site-specific information; it only defines responsibilities. Site-specific procedures are defined in the Respiratory Protection Guide (both sites); Respiratory Protection Procedure (Big Hill); Site-Specific Procedures manual (Big Hill); and various policy memos and reports (both sites) for noise, hard hats, safety shoes, etc. No central document exists concerning site-specific personal protective equipment or use requirements.

o The Subcontractor Safety (120P-9) procedure defines the responsibilities of the site manager, BPS BTR, safety administrator, BPS buyer, and subcontractors. It requires that subcontractors meet BPS safety requirements and make submittals to assure compliance. It also requires that the BTR ensure safe performance and that safe performance be checked by the site safety administrator. This procedure is generally followed.

o The Occupational Safety and Health Complaints (120P-8) procedure provides a mechanism for employees to report unsafe conditions.

o Radiation Safety for Subcontracted Services (120P-21) applies to radiography and well logging operations. It requires posting of the area, perimeter and area monitoring, use of dosimeters and film badges, and recordkeeping. The well logging operation observed was in compliance with this procedure (also see ST.6).

o Confined space entry procedures are provided in Crude Oil Tank Preparation and Cleaning Operations (220P-44) and Safe Work Permits (220P-1). Discussions with the West Hackberry operations manager indicated the use of good practice including use of a safety line, supplied air respirator, reserve air bottle, confined space monitor with rescue equipment, and oxygen/H_2S explosive atmosphere testing. Big Hill BTR records for a tank cleaning operation also indicated compliance with procedure. An actual operation was not observed (see OP.2).

o A Safe Work Permit (220P-1) system has been established to ensure that appropriate precautions are taken prior to work initiation. Personal protective equipment is specified in

general terms. Site/area preparation steps are marked for general items. Combustible gas, H_2S, and oxygen deficiency test results are shown. The system is used; it is currently under revision (see OP.2).

* Medical monitoring requirements are defined in "Occupational Health and Health Assessment Examinations" (8OP-5). Frequency of examinations is based on nature of work, age, and other factors. West Hackberry applies the examination requirements as stated in the OP. Big Hill is in the process of implementing the requirements, but has not done so to date. The following specifics apply to Big Hill and West Hackberry.

  - At West Hackberry, examinations are performed by a general practitioner in Sulphur, Louisiana. At Big Hill, examinations are performed by a regional hospital center in Port Arthur. The facilities were reviewed and approved by Boeing corporate occupational physicians.

  - The type of exposure to hazardous materials for individual workers is not always made clear to the physicians.

  - Specific laboratory tests include audiogram, visual acuity, pulmonary function, chest x-ray, electrocardiogram, blood chemistry profile, blood count, and urinalysis.

  - Results are reported on an "Employee/ Applicant Health Evaluation" form submitted to the lead clerk.

  - The lead clerk at both sites maintains a central file. Records are well maintained at West Hackberry. A "tickler" sheet is available to prompt re-examination. Records for specific individuals were quickly retrieved. Records were not available at Big Hill except for the emergency response team members. Records on file were quickly retrieved.

  - West Hackberry has provided physicals to personnel using respirators. Big Hill has not yet implemented medical surveillance to determine if personnel are physically able to wear a respirator except for emergency response team members. This is in violation of OSHA 29 CFR 1910.134 and DOE 5480.8. Big Hill is in the process of implementing a medical surveillance program for respiratory protection.

  - The medical report form states whether the person is acceptable for emergency response training (ERT), but

does not specifically state whether certification for wearing a respirator is granted. Big Hill has recently developed a specific form concerning the ability to wear a respirator. It is in the process of being implemented.

- Some employees have been restricted from various work activities based on medical findings, a good practice.

- No medical monitoring program is in place for personnel exposed to lead in painting, scraping, grinding, sandblasting, and welding operations.

CONCERN: See MC.5-5.

* No carcinogen control program, as required by DOE 5480.10, exists. Small quantities of asbestos (both sites) and chloroform (West Hackberry) are onsite. Lead chromate paints may also be in use. However, the Safety Department's position is that carcinogens are not used to the extent that "creates a significant potential for occupational exposure." Therefore, the carcinogen program requirement of DOE 5480.10 would not apply. No evidence was found to dispute this position during this appraisal; however, MSDS for all products and chemical formulations (i.e., paints, cleaners, solvents, etc.) have not been reviewed.

* No program plan for chemical/physical hazard exposure monitoring exists. The type and frequency of exposure monitoring has not been established.

* A complete occupational health hazards inventory is not maintained.

CONCERN: See IH.2-1 and IH.3-1.

C. FIRE PROTECTION

BPS has not assembled all the major elements necessary for a complete fire safety program that is fully responsive to DOE requirements. The BPS fire safety program is concerned with personnel and property protection, safe work permits, and those objectives are accomplished by means of three major activities: (1) doing those things necessary to mitigate the probability of ignition (i.e.,non-combustible construction, segregation of hazards, lightning protection, safe work permits, explosion proof electrical equipment); (2) doing those things necessary to detect fires, notify personnel, and suppress fires once started; and (3) post fire restoration. Over all of these activities, a management and administrative control system is necessary to assure implementation of goals and activities.

The lack of a sufficient number of emergency exits at caverns and at the High Pressure Pump Pad at West Hackberry is not consistent with the intent of the life safety code and DOE Orders. During a fire emergency, the person manning a fire monitor may have an excessive travel distance to an emergency exit (crashout gate) should conditions during the fire change (i.e., wind shift, explosion pipe rupture, well blow out, etc.). This potential is partially ameliorated at the High Pressure Pump Pad because the fire monitors are used only as backup to the fixed extinguishing systems and can be operated remotely. However, other escapees at an early stage of a fire might have to crawl beneath and/or over cable trays and piping. Similarly, some of the emergency routes in NOLA buildings are not maintained in accordance with the Life Safety Code.

At Big Hill, the lack of adequate egress was identified in the construction review prior to the installation of the new security fence around the Crude Oil and Raw Water pumping areas. The design review failed to detect this problem.

Site designs do not fully meet the requirements of DOE Orders relative to Improved Risk. Neither West Hackberry nor Big Hill has met Improved Risk status as required by DOE Orders. At West Hackberry, the Alligator Substation has not been provided with suppression detection or passive barriers. There is management concern regarding the adequacy of fire water supplies to the Big Hill Raw Water Intake Structure(RWIS). Several fire safety manuals have not been written and some currently used procedures, including maintenance cards, contain procedures with insufficient information. This results in an inadequate program.

Fire hazards at both sites have not been adequately identified and some identified hazards have not been corrected for long periods of time. Surveillance, maintenance, and hazard detection/reporting activities for fire safety-related issues have been inadequate. Examples of inadequately identified hazards are the location of conventional electrical fixtures in areas where explosion proof equipment is needed, the lack of fire doors and improper storage of magnetic tapes in the computer facility. Management overview has not completely resolved long standing issues and deficiencies that had been reported previously.

Neither West Hackberry nor Big Hill is in compliance with 29 CFR 1910.120(1)(3) as it relates to requirements for equipping and completing training of the Emergency Response Team (ERT). These sites should be in compliance with the intent of the regulation upon completion and implementation of the work by the recently formed ERT Program Development and ERT Training Committee.

Fire protection engineering reports directly to the Engineering Directorate, and indirectly to the Security and Fire Protection organization. Fire protection specialists onsite are responsible to the Fire Chief in NOLA, yet receive direct orders from their respective site managers. The site managers are responsible for fire safety at their site. This division of authority and responsibility can lead to inadequate fire protection system designs, fire inspections, and fire fighting operations. Both organizations are referencing obsolete DOE orders. Existing Level III design criteria also reference obsolete DOE orders.

C.1 DOCUMENTED PROGRAM - FP.1

PERFORMANCE OBJECTIVE: The Fire Protection Program should identify, evaluate, minimize, and control those activities that may have adverse impacts on the safety and health of the public and employees or have potential for accidental loss and damage to government property.

FINDINGS:

- o BPS Corporate Policy 10A1 documents "Security and Fire Protection".

- * A BPS Fire Protection Program Action Plan was published in 1986, and a BPS Fire Protection Management Plan was published in January, 1987. However, the Fire Protection Program Management Plan and Procedures Manual, Fire Brigade Organization and Training Manual (estimated completion September 1989), and Fire Prevention standards are not yet complete. These three documents will contain approved procedures to implement the fire protection management plan.

- * The Systems Engineering/Fire Protection Engineering Plan (Document D 506-01489-09, Revision 1: November, 1988) establishes the goals, defines functional responsibilities, and delineates the activities of the Fire Protection Engineering Group.

- * There is a documented program in effect at the sites that follows DOE/Oak Ridge Operations (ORO), inspection, testing, and maintenance frequency requirements for fire suppression, detection, and alarm equipment, except in NOLA buildings. At West Hackberry, certain types of equipment, which are essential elements of a complete fire protection program, are not being inspected and maintained. This is evidenced by the failure to maintain the integrity of classified electrical equipment and the deterioration of the lightning arrestor system.

- * Information necessary for implementing a Preventive Maintenance (PM) program for fire safety equipment utilized in New Orleans is not in the Integrated Logistics System (ILS) where it would be tracked and analyzed.

- * The existing SPR Fire Protection Systems and Equipment Operating and Testing Procedures Manual (Publication 120-84-AS- 004, January, 1985) continues to be used at both sites while the three implementation manuals are undergoing development. This document is in revision with an expected completion date of September 29, 1989.

- * Approved fire safety inspection and maintenance/ testing of the fire suppression/detection equipment procedures have not been completed, even though action and management plans have been in effect since 1987. The schedule for completion of

these procedures indicates that most of them will not be completed before the end of fiscal year 1989.

CONCERN: See MC.7-1 and MC.5-2.

C.2 SURVEILLANCE OF ACTIVITIES - FP.2

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to maintain control of fire hazards to the public and employees and to minimize accidental losses and damage to government property.

FINDINGS:

- o Fire safety hazards are not always adequately identified, in spite of the fact that inspections, reviews, and audits of the site for potential fire hazards are conducted.

- * There is an abatement program to correct or control identified fire hazards at the sites. Minor deficiencies are usually corrected in a timely manner when the corrections can be controlled by the onsite fire protection specialist. However, major deficiencies are often not being resolved in a timely manner. A review of one selected major item contained in the Fire Protection Audit Tracking System (Publication D506-02010-09- November, 1988) for the West Hackberry facility revealed that the fire pump relief valve problems had not been permanently corrected as of November, 1988.

  - Fire pump relief valve problems were reported in the Hazard Abatement Tracking System (HATS) at SPR sites as early as 1985. Fire pump relief valves are required by NFPA 20 (mandated by DOE 5480.7) for the protection of other components of the fire water system (fire mains, sprinkler systems, etc.). There have been frequent fire pump relief valve failures reported because of corrosion; though some SPR documents indicate that the problem is occurring because of silt accumulation. The problem may be that the relief valve is being used to control pump pressure which is not the valve's proper function.

- o The DOE/SPRPMO Big Hill Site Management Appraisal (September and October, 1988) reported that pressures were observed on certain components of the fire suppression systems which exceeded the manufacturer's rated pressures. The NOLA fire protection engineering staff is providing Big Hill with guidance in order to resolve the problem.

  - The Fire Protection Engineering Department schedule (December 6, 1988) indicates that a "Fire Protection Systems Analysis for Big Hill" will be completed in April 1989.

- * At both sites, fire safety deficiencies delineated in the HATS are not included in the Quarterly Summary of the Fire Protection Audit Tracking System.

CONCERN: See MC.7-2.

FINDINGS:

* Some caverns at West Hackberry were equipped with conventional electrical fixtures where explosion proof equipment was needed. A report issued by Walk, Haydel and Associates (WH&A), August, 1988, indicated that, in addition to the explosion proof fixture problem, numerous other National Electrical Code (NEC/NFPA-70) violations existed. BPS had requested that WH&A make these NEC inspections following BPS appraisal findings at the Weeks Island site. A similar draft report was issued by WH&A for Big Hill in December 1988.

  - Both reports contained descriptions and photographs indicating numerous NEC violations not previously discovered during the fire inspections and other readiness review inspections by BPS personnel. For example, the WH&A report indicated that there were areas at the site (i.e., the fire/flush pump at Cavern 6) that were in violation of the NEC because such locations are classified as hazardous locations.

* There is no consistency regarding electrical code hazard classification at West Hackberry. For example, some caverns had hazardous location explosion proof fittings in one part of the cavern pad and other locations on the same cavern pad did not. The proper electrical fixture was compromised by a non-explosion proof fitting adjacent to an explosion proof fitting in the same conduit line.

* Screws were missing from junction boxes. Non-explosion proof equipment should not have been installed inside the hazardous classified zone where methane gas must be bled off.

o The drawings for both sites complied with NFPA 497A, a companion document to NFPA 70. This standard provides details for installation of explosion proof electrical equipment.

* Observations during this appraisal, and noted in the WH&A reports, indicated a deterioration in the lightning protection systems at West Hackberry. These had not been detected and reported by BPS surveillance and appraisals. The lightning protection systems had been installed in accordance with NFPA 78 entitled "Lightning Protection Code" and NFPA 70 "National Electrical Code".

* There are no NFPA hazard labels on above ground tanks, cylinders, and/or containers for ERT identification and employee hazard identification as described in NFPA 704 and required in OSHA 1910.1200 (both DOE 5480.7 requirements) at either West Hackberry, Big Hill, or New Orleans.

* The diesel, gasoline, and propane storage tanks in the vicinity of the maintenance shop warehouse and parking lot at West Hackberry were not marked, isolated, and spaced away from potential ignition sources and/or physical hazards. These tanks present a fire hazard to personnel, other site equipment and buildings.

* There are numerous fire code and Life Safety Code violations in several of the buildings occupied by NOLA and the Strategic Petroleum Reserve Project Management Office (SPRPMO). Some of the conditions are: existing corridors are being blocked by furniture and other items; fire extinguishers are not being properly mounted or are not visible; exit lights are not functional or are obstructed; sprinkler heads are obstructed and, in the case of the GSA warehouse, rooms have been added without extending the existing sprinkler system. The warehouse does not have the required minimum of two exits.

* No exhaust hood was provided over a large cylinder of anhydrous ammonia in the reproduction center in Building 850. No hazard identification label was found on the cylinder.

* Many fire code violations were found in the computer facility in Building 850 of the SPRPMO. Sprinkler heads were improperly spaced. The halon system has not been inspected at the frequency required by NFPA 12A. The inspection tag on the cylinder was dated September 1986. A large quantity of magnetic tapes in the computer area is not stored in a separate storage area away from the computer facility as required by DOE/EP-0108. Housekeeping was poor. Portable halon extinguishers were left on the floor and desktop instead of being mounted on the wall as prescribed by OSHA and NFPA. One aisle leading to an exit did not have the proper width for egress.

* A BPS fire prevention inspection, conducted during February 1988, and published on May 16, 1988, of the New Orleans facility found many of the above fire safety deficiencies. An earlier BPS safety audit memorandum, covering some of the same fire safety deficiencies was issued on December 23, 1987.

CONCERN: See MC.2-2 and MC.5-3.

C.3 POLICIES, DIRECTIVES, AND PROCEDURES - FP.3

PERFORMANCE OBJECTIVE: Official policies, directives and procedures should define the fire protection responsibilities and authorities; provide a statement of management participation and support; require compliance with DOE requirements; and provide resources for overall program implementation.

FINDINGS:

* BPS Corporate Policy 10A1, "Security and Fire Protection", Revision 0, July 18, 1985 is a two page document referencing the Department of Energy, Department of Defense, Federal Aviation Agency, and the National Fire Protection Association. However, this Policy does not cite DOE orders or SPR publications on fire protection specific to DOE facilities or to SPR operations.

* Existing written operating procedures do not provide adequate direction to ensure that potential fire hazards are eliminated and/or minimized and that fire safety requirements are uniformly implemented.

* BPS Operating Procedure 100P-1 entitled "SPR Fire Protection Program" references DOE 5480.1 (Chapter VII), but does not provide fully for implementation of the requirements therein (risk, maximum loss criteria, etc.).

o A responsibility of the site Fire Protection Specialist is training non-fire safety personnel. At Big Hill, there are training programs (slide, video, and written text), that include ERT Training. Programs include purchased material and video tapes made onsite to address site specific potential problems. This training is structured to allow supervisors to make the presentations. Training is documented for each employee attending the meetings.

* SPRPMO Level III criteria and BPS fire protection and prevention documents reference a Military Standard Manual (MIL- HDBK-1008). The manual is not listed in DOE 5480.1B. and it does not fully meet DOE requirements for facilities such as those found at the SPR. Level III criteria dictates compliance with the most stringent of listed documents.

* Site specific procedures or guidelines were not found at West Hackberry to instruct employees (1) in the proper storage of flammable and combustible liquids or (2) where the classified electrical equipment is to be used. Procedures have not been completed in New Orleans to document site specific procedures.

* At West Hackberry, the Fire Protection Specialist did not have documentation regarding the location of classified electrical equipment areas of the plant.

* Appropriate, current site-specific policies, directives, and operating manuals for the Fire Safety Program are not available in a consistent, effective, or usable format.

CONCERN: See MC.7-1.

C.4 MANAGEMENT CONTROL SYSTEMS - FP.4

PERFORMANCE OBJECTIVE: Management control systems should be in place to assure that fire protection requirements are effectively carried out in the siting, design, procurement, construction, operation, maintenance, modification and decommissioning phases of the life cycle of a project or facility.

FINDINGS:

o Responsibility for fire safety at the various BPS sites is divided as follows:

- Fire protection engineering personnel are members of the System Safety Fire Protection Engineering organization; Systems Engineering Department; and Engineering Directorate. This fire protection engineering group is also "softlined" to the manager of Fire Protection. All members of the Fire Protection Engineering Organization are professional engineers.

- The fire protection specialists at each site are responsible to the Fire Department Chief in NOLA who works under the direction of the Manager of Fire Protection who in turn answers to the Director of Security and Fire Protection. The site fire protection specialists however are "softlined" to the site managers and receive direct orders from their respective site managers when onsite.

* DOE's A/E drawings, equipment data, and calculations for fire protection are readily available in the New Orleans library. However, BPS contractor and DOE vendor drawings are not currently available for quick reference or rapid response to emergency situations and maintenance at the sites.

o When design reviews (30, 75, or 100%) are conducted on site, Fire Protection is actively involved.

o Inspections and readiness reviews during and after construction are conducted with fire safety participation.

* The Safety Analysis Report (SAR) for Big Hill (October, 1987) and the HATS tracking system indicate a need to determine if the Emergency Shut-Down Device (ESD) would operate as intended to provide safe and orderly shutdown.

- As a part of the check out of the Distributed Control System an operational check identified that the existing pneumatic time delay push buttons for the wellhead ESDs do not have the capability to close the wellhead Motor Operated Valves (MOV's) completely. An ECP is being prepared.

* An exchange of correspondence between the SPRPMO and BPS during the past year has not resolved the adequacy of the site fire water supplies, and the site tank refill time.

* The design and construction of the facility to house the main computer in Building 850 was a BPS project. Boundary walls were shown on the drawings to be one hour barriers and were to have appropriately labeled fire doors. No labeled fire doors were found. No drawings have been located to determine whether fire dampers were required or needed. The halon system has not been tested (other than initial concentration tests) as required. Smoke detectors are required to be tested and installed in accordance with NFPA 72E. No data exists to indicate that the detection system was designed and installed in accordance with the standard. A check of the Integrated Logistics System (ILS), to determine if PM cards have been prepared, indicated that data for preventive maintenance has not been received even though the system was installed in 1986.

* The Fire Protection Engineering Department is currently performing a fire protection systems analysis for Big Hill to determine what is needed to maintain the systems and whether the system design meets DOE and Improved Risk standards. The analysis was started in October 1988 and the final report is scheduled for completion in late April 1989 prior to starting cavern crude oil fill.

* The overall Fire Safety Program is not completely documented and deficiencies have been found in procedural documents.

* Many of the site management staff are trained in fire fighting and spill control but are not knowledgeable in fire prevention, detection, and fire protection engineering fundamentals.

* There is no evidence that management and administrative controls have provided adequate assurance that the Fire Safety Program is effective.

* The division of authority and responsibilities of the various organizations (FP Engineering, Fire Chief, Site Fire Protection Specialists, and Site Managers) can lead to inadequate fire protection system designs, fire inspections, and fire fighting operations.

CONCERN: See IH.4-1.

C.5 LIFE PROTECTION - FP.5

PERFORMANCE OBJECTIVE: The facility should provide adequate egress facilities for all its occupants under all normal and emergency conditions.

FINDINGS:

- o Caverns and high pressure pump areas, as well as other secure areas, at West Hackberry are surrounded by alarmed "taut barbed wire" fences for intrusion prevention. Various locations at Big Hill will be provided with intrusion protection.

- * Unshielded, stationary fire suppression monitors have been provided at strategic locations inside the fences of cavern and High Pressure Pump Pads at West Hackberry. These monitors are for the use of ERT members. Widely scattered crash (emergency exit) gates have been provided to permit exiting under emergency conditions (wind shift, pipe or well head rupture, etc.). However, if it were necessary to leave the station, travel distances could exceed the maximum distance specified in the Life Safety Code (100 feet).

- * Some locations at the high pressure pump pads at West Hackberry, have obstructions (piping and cable trays) obstructing emergency egress.

  - The potential hazard to ERT members is mitigated by the fact that the fire suppression monitors are fixed and can be operated remotely. Other persons on the pad may have escape problems depending on their location on the pad should the fire spread rapidly.

- * The only guidance available for improving the conditions outlined above may be found in NFPA-101 "Life Safety Code Handbook" which contains the complete text of the 1988 NFPA-101 Life Safety Code. The special structures Chapter (No. 30) states that" structures present a special challenge to life safety" (page 1133). "Although the code is essentially complete, providing adequate egress from many special structures will require unique solutions" (page 1134). The handbook further states that "engineered solutions in many instances will exceed the minimum provisions of Chapter 30" and "that the uniqueness of a structure should not become an excuse for reducing safety to life" (page 1134). The maximum travel distance specified in Chapter 30 is 100 feet. Travel distances in West Hackberry caverns exceeds this number.

* Some of the fire exit access corridors in NOLA and SPRPMO buildings have not been designed or maintained as prescribed in NFPA 101.

CONCERN: (FP.5-1) (Category II) (H1/C1)

The safety of ERT members cannot be assured at West Hackberry because of excessive travel distances to existing crash gates.

C.6 IMPROVED RISK - FP.6

PERFORMANCE OBJECTIVE: The facility should qualify as an "Improved Risk" or "Highly Protected Risk" as commonly defined by the property insurance associations specializing in such coverage.

FINDINGS:

* The Alligator Substation at West Hackberry containing oil-filled circuit breakers and high value, long-term delivery transformers, has not been provided with detection and suppression systems and/or passive barriers as required by DOE 5480.7. and 6430.1A. The substation is the sole source of power for the site. The substation was purchased from Gulf States Utilities on August 1, 1988.

* At West Hackberry, the Drawdown Critical Item Warehouse (Building D-308), has not been provided with a fixed suppression system.

* At West Hackberry, trailers have been placed in close proximity to permanent structures in violation of DOE/EV-0043.

* Fire protection water for the RWIS is supplied from the discharge of the raw water pumps and provides a single supply of water to the RWIS. The lack of an independently powered second fire pump violates the concept of "improved risk" and good fire protection engineering practice as delineated in Factory Mutual (FM) and Industrial Risk Insurers (IRI) documents. There are no written operating procedures or emergency procedures for the valve between the RWIS Fire Water System and the Facility Fire Water System to specify when the valve is to be opened.

CONCERN: (FP.6-1) (H2/C1) The Sites fail to fully meet "Improved" or "Highly Protected" risk criteria required to comply with DOE 5480.7. See MC.5-2.

C.7 OFF-SITE PROTECTION - FP.7

PERFORMANCE OBJECTIVE: The facility should not present an unacceptable risk to the public or the environment as the result of an onsite fire permitting the release of hazardous materials beyond the site boundaries.

FINDINGS:

- Hazardous substances (OSHA 29 CFR 1910.120 (1)(3)) are present at both sites. A criterion used for determining unacceptable risk as the result of onsite fire releasing hazardous materials is the existence of an adequate emergency organization to initiate control during and following a fire. The first responders at BPS/SPR sites is the ERT.
- An ERT Program Development and ERT Committee Chaired by the BPS Emergency Management Department has been established to develop a functional ERT Training Program. Committee membership is composed of members from the security, fire protection, and safety disciplines.
- Both sites have begun implementation of the training and equipment needs required for full implementation under the guidance of the aforementioned committee with assistance from the site fire protection and environmental specialists.
- Training programs for ERT members include both fire fighting and hazardous substance countermeasures.
- The program being implemented meets the intent of 29 CFR 1910.120 (1) (3).
- Upon completion of the ERT Program Development and ERT Committee work, the program will meet SPR needs.

CONCERN: None.

D. TRANSPORTATION AND SHIPPING

No formal BPS program exists to assure that transportation and shipping activities are conducted in compliance with Department policy and applicable regulations and standards. There is no overall policy to guide employee behavior, and although some elements of transportation and shipping are covered in documents, there is no frame of reference for planning and action. Additionally, responsibilities and the assignment of authority for transportation and shipping activities are unclear.

BPS transportation and shipping operations are not covered by specific procedures. The transportation of hazardous wastes is covered in a policy and procedures document to which operating instructions are subservient. Assurance of satisfactory performance is not achieved because employees have no hazardous materials transportation and shipping guidance.

There is no specific training for hazardous material transportation and shipping, a violation of 49 CFR and Louisiana and Texas state transportation regulations. BPS does not have a specific quality assurance program protocol for transportation safety; therefore, the quality assurance coverage of transportation-related activities is minimal. Unsatisfactory performance in transportation and shipping results from the lack of training and a specific quality assurance coverage.

A corrosion control program is established that includes cathodic protection, monitoring, and coupon testing. Some cathodic protection procedures are incomplete with reference to the BPS Corrosion Control Manual. The manual is based on industry standards and regulations, but the procedures which are intended for day-to-day guidance do not include sufficient, salient details for use during corrosion inspections. The site corrosion technician training programs require improvement.

Transportation and shipping safety is adversely affected by the lack of policy statements, and nonexistent or, at best, incomplete procedures. Minimum levels of knowledge and skills in transportation and shipping activities are not specified, which exacerbates these conditions. Finally, few training efforts are underway to enhance transportation and shipping competency.

D.1 DOCUMENTED PROGRAM - ST.1

PERFORMANCE OBJECTIVE: The packaging and transportation program should identify, evaluate, minimize and control those activities that may have adverse impacts on the safety and health of the public and employees or have potential for accidental loss and damage to government property.

FINDINGS:

* There is no documentation of a packaging and transportation safety program for hazardous materials.

* There is no formal system to assure that transportation activities are being conducted in accordance with established requirements.

* No one individual or department is assigned the overall responsibility for transportation management. New Orleans staff is generally unknowledgeable of transportation issues and problems with which the line must deal. For example, the New Orleans safety staff incorrectly decided that 49 CFR did not apply to the transportation and shipment of hazardous materials by motor vehicle, and correctly decided that Part 195 did apply to the transportation of crude oil by pipeline. Additionally, the New Orleans Quality Assurance (QA) Staff has no individual knowledgeable in the safe transportation of explosives.

* The QA program, as documented, is not applied in any specific way to transportation and shipping.

* There is no documented program to verify that contractual requirements for transportation safety are being met by subcontractors. (See ST.6.)

* The Appraisal Team reviewed a Draft Project Directive titled "Packaging, Transportation and Handling" dated January 25, 1989. The draft assigned responsibility for a transportation program to the Director of Business Management and Administration through the Manager, Property Control. The draft included the mandate to establish a support team, develop procedures, recommend responsibilities, prepare an implementation plan and a training plan.

CONCERN: (ST.1-1) (H2/C1) No formal program exists to assure that hazardous materials transportation and shipping activities are conducted safely.

FINDINGS:

* Hazard evaluation and tracking is accomplished by the use of a risk coding matrix, SAR reports and the Hazard Abatement Tracking System (HATS). An example of the use of HATS is Item HAT12RRP-01, page 91, Hazard Number WH-039-81-C, dated April 6, 1981, describing the need to provide a leak detection

system to monitor pipeline integrity for all crude oil transfer operations between West Hackberry and Sunoco. As of November 10, 1988, this item had not been closed.

CONCERN: See MC.7-2.

FINDINGS:

- Corrosion protection for pipelines, piping, pumps, valves, storage tanks, and similar equipment is documented in the "Corrosion Control Handbook, Document No. D506-01182-09, Revised November 1988." This manual is required by 49 CFR 195.402.
- BPS has a Spill Prevention Control and Countermeasures Plan required by 40 CFR which includes monthly inspections of all pipelines.
- The BPS Systems Engineering Management Plan provides for safety evaluations of pipeline operations such as systems analyses, risk analyses, system verification, and technical performance assessment.
- The BPS Implementation Plan provides for failure modes and effects analyses and the Failure Reporting Analyses and Corrective Action System (FRACAS) analyses.
- A pipeline ultrasonic testing baseline program was completed at all sites in 1988. A testing program was initiated with testing on a 4- to 6-month rotation basis. Data will be used for trend analysis. Required changes in corrosion/ erosion protection, and/or required repairs and maintenance will be accomplished. The program was developed at New Orleans and is being implemented by New Orleans and site pipeline staff. It is consistent throughout the SPR. New Orleans pipeline staff is cognizant of site pipeline problems, and interacts effectively with site pipeline staff.
- The DOE SPR Design Criteria Level III document, Revision A, dated March 1987, to which BPS is contractually bound, specifies external and internal pipeline corrosion control per ANSI/ASME B31.4, Chapter VIII.
- National Fire Protection Association and National Association of Corrosion Engineers manuals are used to conduct pipeline preventive maintenance corrosion protection activities.
- BPS has an "Environmental Programs and Procedures Manual Publication, Document No. D506-01011-09," dated May 30, 1986, which identifies and defines programs and procedures mandated by Federal, state and local regulatory agencies to assure all sites operate in an environmentally acceptable manner. Appendix B has a "Chemical Inventory" for West Hackberry.

Environmental control personnel, in addition to other duties, oversee the generation, transportation, treatment, storage and disposal of solid wastes as defined in 40 CFR.

- Before hazardous materials are purchased and transported onsite, a "Purchase Request Routing and Sign-Off" sheet is used to permit applicable departments to approve each material to be used on site. All hazardous materials brought onsite can be traced to an onsite user.

- Crude oil is analyzed for quality verification at West Hackberry. This capability does not exist at Big Hill. Therefore, crude oil is shipped offsite for analysis.

- West Hackberry watercraft operation documentation is a part of the Supply Services Manual, D506-01061-09, and covers operators, required safety equipment, a pre-departure float plan, and rules of the road.

CONCERN: None.

D.2 SURVEILLANCE OF ACTIVITIES - ST. 2

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to maintain control of potential hazards to the public and employees and to minimize accidental losses and damage to government property.

FINDINGS:

* Corrosion protection technicians conduct surveys and inspections using SPR Maintenance Requirement Cards (MRC) based on the Corrosion Control Handbook. The cards contain step- by-step instructions which are not always complete. An example is MRC No. 390 which specifies the need for a copper-copper sulfate reference electrode but does not state when and how it is to be used.

* At West Hackberry, a review of monthly structure corrosion data on the low pressure pump pads, taken on November 17, 1988, showed that no entries were made to indicate that voltage readings were either plus (+) or minus(-). Therefore, the accuracy of these data is suspect. The Corrosion Control Manual states "Enter a plus (+) sign when the reading is positive and contact the Pipeline Manager immediately." (Ref. Section 6 - Page 22 of 60, Item h.). The data forms also showed that readings were taken which indicated that inadequate cathodic protection was being received on Structures 3, 4, and 5. Steps were taken the week of December 5, 1988, to install new anodes.

CONCERN: See MC.1-3.

FINDINGS:

* The Quality Assurance staff lacks sufficient expertise to recognize the need for including transportation safety items in pre-contract award inspections.

* The Quality Assurance staff is not knowledgeable concerning the safe transportation of hazardous materials.

* There is no backup individual to assume the duties of the Corrosion Control Engineer when necessary. During a six-month period in 1988, the Corrosion Control Engineer was absent from work because of illness. Corrosion protection data was not analyzed during this period. No individual has been cross- trained in corrosion protection duties.

* The efficacy of the pre-contract awards process is diminished by the lack of recognition of the need to include transportation safety items by the QA staff in this process.

CONCERN: See MC. 1-2

- Data collected on corrosion control inspections and surveys are forwarded to the corrosion control engineer at NOLA for analysis and subsequent initiation of corrective action, if needed. No formal analysis is conducted by site personnel.

- A two phase, proactive inspection program has been developed for piping and pipelines. Phase I comprised a comprehensive inspection program of site piping and pipelines not inspected by pigging. Phase 2 entails the implementation of required corrective action. Permanent inspection locations have been developed, an inspection pattern established, and a statement of work developed. A baseline study has been completed and a follow- up program has been planned. Engineering is reviewing these baseline data and the results are not complete. The code used in this evaluation was ANSI B31.4.

- Weekly, monthly, quarterly, and annual corrosion control inspections are conducted on offsite pipelines by site maintenance personnel using marine, land, and air vehicles. Annual inspections are conducted by the New Orleans corrosion engineer. Helicopters are used because of right-of-way disputes and access problems.

- The crude oil 42-inch diameter pipeline between West Hackberry and Sun Terminal was built in 1978, but the cathodic protection system was not activated until late 1979 or early 1980. This lack of corrosion protection probably contributed to external corrosion over an 8-foot longitudinal section which was repaired by the use of a welded sleeve. It has not been necessary to make other major repairs on this pipeline.

- To aid in the location of buried crude oil pipelines the maintenance staff at Sulphur Mines is planning to use satellite-generated maps for validating pipeline geographic locations during normal and emergency conditions along the pipeline.

- The crude oil pipeline control system is not fail-safe. Manual shut down is required during an emergency. Fluor Engineering, Inc., will be tasked in March/April, 1989 to study automatic leak detection and control and other considerations to possibly install fail-safe operation. Operational modeling is a part of this effort. BPS is preparing a conceptual design report for the Flour study effort. (Ref: HAT12RRP-01, page 91, Hazard No. WH-039-81-C).

- BPS was concerned about the potential for offsite crude oil pipeline leaks - particularly in the static mode. Criteria had not been established, especially threshold criteria, for observing pressure drop as a function of temperature change. These data were needed by Control Room operators to decide

when to report a pressure drop as abnormal, i.e., when to report a possible leak. The criteria were requested from New Orleans on October 13, 1988. New Orleans responded with a draft document titled "Interim Pipeline Monitoring Procedure All SPR Pipelines" dated January 1989.

- Formal accident investigations are conducted. An example is the "Report of Investigation of the 36-inch Brine Line Failure at the West Hackberry, Cameron Parish, Louisiana, Strategic Petroleum Reserve site on December 8, 1985".

- The crude oil pipelines are designed and constructed to meet or exceed 49 CFR Part 195 regulations and ANSI B31.4. Water and brine pipelines are designed and constructed to the ANSI B31.4 standard.

- Spill trend analysis data are developed by BPS at New Orleans Headquarters annually and tabulated in the "Annual Environmental Monitoring Report."

- SPR crude oil transmission pipeline internal condition is verified and monitored by scheduled pigging inspections; the installation and analysis of corrosion coupons; and the monitoring of oil, water, and residue samples.

- Pigging operations include the use of cleaning, caliper, instrumented, and batch pigs.

- Cathodic protection of SPR facilities is achieved by maintenance personnel with advice, assistance, monitoring, auditing, and control from the corrosion control engineer in New Orleans.

- Nondestructive Testing (NDT), in accordance with the American National Standards Institute code B31.4, is used to monitor corrosion/erosion adverse effects and trends. Professional NDT technicians are used together with state-of-the- art computerized inspection equipment, as well as permanent inspection locations.

- DOE is solely responsible for the safety of the offsite 42-inch diameter crude oil pipeline that supplies West Hackberry and the 36-inch diameter pipeline that supplies Big Hill. The U.S. Department of Transportation (DOT), Research and Special Programs Administration, Office of Pipeline Safety, does not consider these pipelines to be under its jurisdiction for compliance with 49 CFR 195. The DOT does not assure compliance with this safety regulation, nor does any other third party.

- o Consideration has been given to the voltage drop in the soil in the inspection of the cathodic protection system for piping and pipelines. The soil resistivity is about 100 ohm-centimeters which equates to a voltage drop of 3 millivolts, a value which is within acceptable inspection tolerances and negates any special inspection procedures.

- o The 36-inch, 12-mile crude oil pipeline between West Hackberry and Lake Charles Terminal was designed by Fluor Engineering, Inc. The prime contractor is Michael Curran and Associates. Per Standard Clause 63 of Curran's contract with DOE, Curran is responsible for a quality control program, including inspection of its own work. The quality control program was drafted by Fluor and Curran is using it.

- o Fluor Engineering, Inc., as another function, performs quality assurance reviews of the construction of the 36-inch, 12- mile crude oil pipeline, including the reading of X-rays of welds and other NDT reviews where X-raying is not practicable. DOE audits Fluor and is actively assisted by BPS staff who participate in the reading of X-rays. This process was used on two other SPR offsite crude oil pipelines, one brine line and one raw water line. Two major issues arising from a recent audit are the interpretation of the meaning of a "repair" of a weld per API 1104 and the necessity to visually inspect backwelds.

CONCERN: None.

D.3 POLICIES, DIRECTIVES AND PROCEDURES - ST.3

PERFORMANCE OBJECTIVE: Official policies, directives and procedures should define the safety, health and quality assurance responsibilities and authorities, provide a statement of management participation and support, require compliance with DOE requirements and provide resources for overall program implementation.

FINDINGS:

* There is no general BPS policy statement on transportation and shipping activities. The lack of such a mandate causes a void in transportation program development and implementation. (See ST.1.)

* At West Hackberry, the Property Department uses the DOE "Transportation Operation Procedures Manual", 49 CFR, and the "Hazardous Materials - Storage and Handling Handbook" document No. DLAH 4145.6 dated July 1987 as general references for receiving, storage, and shipping.

* There are no written BPS procedures for the shipping of crude oil samples offsite. The West Hackberry laboratory uses an outdated photocopied United Parcel Service (UPS) procedure for preparing, marking, and labeling of the shipments.

* In preparing hazardous materials shipments, West Hackberry laboratory personnel use a 1978 edition of 49 CFR for compliance. The site library contains a 1986 edition of 49 CFR, Parts 178- 199. Copies of 49 CFR were not observed in other West Hackberry locations. Site personnel at Big Hill use current copies of 49 CFR available from the library.

* Specific procedures covering transportation regulations are not included in the "Supply Services Manual" (D506-01061-09, October 10, 1987) and the "Transportation Operations Manual" (DOE/NBM 1081).

* Technical resources and information are readily available through the site library, the BPS New Orleans library, and construction records as required by 49 CFR 195.404. However, current copies of 49 CFR were not found in the Property Department, laboratory, or site library at West Hackberry.

CONCERN: See MC.7-1.

FINDINGS:

* No individual with hazardous materials transportation training (as required by 49 CFR 173.1(b)) has been identified onsite. However, the Property Department at both sites had an individual scheduled for the GSA Hazardous Materials Training Class for shipping, receiving, and storage scheduled for January 23-27, 1989. The class was subsequently cancelled, but the individual from Big Hill was re-scheduled for an April 3-7, 1989 class.

* There is no BPS program for formal corrosion control training. Cathodic protection training is accomplished by the New Orleans Headquarters corrosion engineer through on-the-job lectures and demonstrations when the engineer visits the sites annually.

* There is a frequent turnover in "trained" cathodic protection technicians because of BPS reassignment.

* At West Hackberry, one attempt to obtain formal training at a National Association of Corrosion Engineers' sponsored class in Houston, Texas, was unsuccessful because the two attendees were not sufficiently trained to benefit from the level of instruction in the class.

* At Big Hill, two electrical technicians completed a course, entitled "Cathodic Protection Rectifier Service School", on February 4, 1988. The course was given by Good-All Electric, Inc., of Fort Collins, Colorado. A total of four of the eight technicians are scheduled for this training.

* At West Hackberry, crude oil pipeline corrosion control technicians were given a formal 8-hour class in rectifier training in 1984 by a representative of the Rio Engineering Company. No formal training has been given since.

* BPS provides training in partial compliance with 49 CFR 195.403 by means of the Fire Fighting School at Lamar University. BPS Emergency Response Team training, periodic operational drills, and specialized equipment maintenance training are given.

* The Corrosion Control Handbook is not clear as to training requirements for individuals performing cathodic protection activities because it is stated in Section 6 - Page 52, that "Note: For brevity, the individual who performs the duties of a corrosion technician is referred to by that title in this manual, even though he or she has a different job title." Neither a job description nor minimum performance requirements for a cathodic protection technician are prescribed.

* The type and extent of cathodic protection training given to West Hackberry corrosion technicians is minimal considering the fact that the Corrosion Control Manual states that "Site Maintenance is staffed to provide expert consultation in measurements, corrosion factors, electrical considerations, site inspections, and equipment inspections."

CONCERN: See MC.6-2.

FINDINGS:

- o BPS has an "SPR Off Site Pipeline Maintenance and Repair Handbook, Document No. D506-01184-09, Revised November 1988", and an "SPR Oil Spill Contingency Plan" that are used to meet the requirements of 49 CFR 195.402 requiring a procedure manual for operations, maintenance, and emergencies.

- o Proper personal protective equipment for hazardous materials handling is made available and its use is emphasized through the response sections of each Safe Work Permit and stated in the "Off- site Pipeline Maintenance and Repair Handbook Document 154-82-AS- 004" dated September 30, 1982, Section 3.1.6, "Safety Precautions."

- o The West Hackberry Property Department holds a weekly safety briefing. The "Warehouse Supervisor's Bulletin" is used by this department for updates on safety issues concerning transportation, materials handling, and distribution.

- o The Property Department, laboratory, and corrosion protection personnel have adequate material and equipment resources required to carry out their transportation responsibilities safely.

- * BPS NOLA staff conducted audits in August and October, 1988; transportation and shipping activities were a part of these audits. The results included comments relative to the lack of BPS-wide transportation and shipping procedures.

CONCERN: See MC.7-1.

D.4 MANAGEMENT CONTROL SYSTEMS - ST.4

PERFORMANCE OBJECTIVE: Management control systems should be in place to assure that safety and health requirements are effectively carried out in the siting, design, procurement, construction, operation, maintenance, modification and decommissioning phases of the life cycle of a project or facility.

FINDINGS:

* The existing BPS management control system does not fully provide for the assignment of the responsibility for transportation safety. Assignments made cannot be effectively carried out because of the lack of adequate policies, procedures, and guidelines. (See ST.3.)

* No evidence was found of strong BPS management support and clear lines of communication for handling transportation issues. However, BPS has started to remedy the situation. (See ST.1.)

* No evidence was found that the responsibility for compliance with Federal and state transportation safety regulations is explicitly assigned within the BPS organization.

* There are no management audits specifically conducted for transportation activities.

* There is a lack of awareness of the need for transportation and shipping safety in the BPS management control system.

* The BPS management control system lacks clarity in the assignment of transportation safety responsibility, the means for clear communications, the delegation of regulatory compliance actions, and the need for an awareness of transportation safety.

CONCERN: See MC.1-1.

FINDINGS

o There have been four shipments (initiated in July, 1988) of crude oil properly prepared for shipment offsite as "crude oil, petroleum, limited quantity", by the Big Hill Property Department. The shipping papers were prepared and signed by the Environmental Specialist, but no assigned responsibility for him to sign was found. The New Orleans environmental staff did not interact with the Big Hill environmental staff to remedy this situation.

o The West Hackberry Property Department prepared 1,115 documents for offsite shipment of all materials in FY 1987 which include about 35 shipments of hazardous materials. During the period October 1 to December 11, 1988, there were 604 documents prepared for offsite shipments of all materials including five shipments of hazardous materials.

- The Big Hill Property Department prepared 589 documents for offsite shipment of all materials in calendar year 1988. This figure includes four shipments of crude oil petroleum samples and one hazardous waste shipment.

- Management responsibility for the corrosion protection of the crude oil pipelines of the Texoma Group is assigned to the Sulphur Mines staff. Technical direction and guidance are provided by the New Orleans pipeline staff, who are overseeing the performance of the Sulphur Mines staff.

- BPS is implementing a project directive "Pipelines and Site Piping Assurance Program", PD-60-R1, that establishes a project level position on actions to be taken to assure pipeline and piping systems will support drawdown requirements safely and adequately.

- The electrical superintendents responsible for corrosion protection at both sites are involved in pre-construction reviews of pipelines and pipeline facilities.

- Transportation safety is a specific consideration in property procurement activities.

CONCERN: None.

D.5 CONDUCT OF TRANSPORTATION AND SHIPPING - ST.5

PERFORMANCE OBJECTIVE: Site-wide operations involving packaging, materials handling and movement, and transportation (PHMT) should be conducted in a safe, consistent, and accountable manner, following approved procedures, in conformance with applicable standards and accepted practices.

FINDING:
* There are no BPS written procedures for shipping hazardous materials.

CONCERN: See MC.7-1.

FINDINGS:
* There is a lack of consistent compliance with applicable Federal and state standards. There is no program to ensure or measure compliance with applicable Federal and state regulations.

* Site security is provided by a subcontractor, Wackenhut Services, Inc. The security guards check for authorization of explosives and flammables to enter the site; they do not log all hazardous materials that enter the site or check for the U.S. Department of Transportation (DOT) required shipping papers.

* At Big Hill, BPS infrequently uses a 3,000 gallon vacuum truck for onsite transportation of crude oil. This vacuum truck was not certified to DOT or any other specification requirements; therefore, there is no assurance that the cargo tank will perform its function safely.

CONCERN: See MC.5-5.

FINDINGS:
o BPS conducts pipeline maintenance using the "SPR Offsite Pipeline Maintenance and Repair Handbook, Document No. D506-01184-09, Revised November 1988," and the "SPR Oil Spill Contingency Plan" which meet the requirements of 49 CFR 195.402.

o Visual inspection is conducted on all packages arriving at the site warehouse and a "Report of Discrepancy (ROD)," Standard Form 364, is completed when necessary. Systems are in place to control disposition of discrepant materials (see section TS.5).

o The Property departments check incoming packages of hazardous materials for breakage and leakage. Vehicles are checked before leaving the warehouse offsite release.

CONCERN: None.

D.6 PACKAGING AND TRANSPORTATION OF HAZARDOUS MATERIALS - ST.6

PERFORMANCE OBJECTIVE: Performance of the packaging and transportation functions should assure conformance with existing standards and accepted practices as given in DOE 5480.3, and its references.

FINDINGS:

* BPS does not assure that shipping papers, marking, labeling, and authorized specification packages of hazardous materials shipped and transported on and offsite by BPS and subcontractors are in compliance with Federal and state transportation regulations and DOE 5480.3. Examples are crude oil laboratory samples, crude oil in vacuum trucks, radioactive materials, and explosives.

* A well logging subcontractor at each site was observed to be operating in violation of 49 CFR and DOE 5480.3. These violations included improper marking, labeling, and shipping papers for radioactive materials and explosives. Personnel at these sites immediately initiated corrective action when apprised of the violations.

* The West Hackberry laboratory shipped a laboratory instrument containing radioactive material as 50 millicuries of Iron-55 (Fe-55) offsite. Although properly packaged, no certification was used as required by 49 CFR 173.421-1(a).

* The West Hackberry Laboratory Department shipped crude oil samples offsite for analysis in violation of 49 CFR and DOE 5480.3. These violations included the use of nonspecification wooden boxes, and improper marking and shipping papers. (See ST.4.)

* The DOE-owned vacuum truck assigned to West Hackberry was inspected during the annual BPS site audit. This audit did not assess the motor carrier safety requirements found in DOE 5480.3 and 49 CFR 177.804 because the audit team did no have the necessary expertise.

* The two DOE-owned vacuum trucks at West Hackberry (one temporarily assigned from the Bayou Choctaw site) do not meet the placarding requirements of 49 CFR 172.504(b) or the packaging requirements of 49 CFR 173.119(b), when transporting crude oil. Additionally, BPS is not in compliance with DOE 5480.3 and Louisiana state regulations when transporting crude oil across Black Lake Road. This was not recognized as being a problem because BPS lacks the expertise in the transportation and shipping program.

* Training is not in compliance with the requirements in 49 CFR 173.1(b). Section 6 - Page 1, of the "Environmental Programs

and Procedures Manual, Publication D506-01011-09", dated May 30, 1986, states that training must be conducted every two years. (See ST.3-2.)

* The Louisiana Community Right-to-Know/Hazardous Materials Information Development, Preparedness, and Response Act requires that pipelines, not within the fence line of the facility, are to be reported for each parish on a form listing all pipelines operated by the facility in the parish, the material being transported, the pipeline diameter, and the maximum operating pressure. A map for each parish indicating the location of each pipeline is required to be provided to the Emergency Response Commission and the Local Emergency Planning Committee. There has been no reporting of SPR pipelines to the respective organizations.

* The Louisiana Community Right-to-Know/Hazardous Materials Information Development, Preparedness, and Response Act requires that any substance listed in Appendix B of the law which exceeds 500 pounds is to be reported for the prior calendar year by March 1, 1988. Appendix B is an excerpt from 49 CFR 172.101. BPS stores and uses substances listed in Appendix B in excess of 500 pounds. Examples of these substances are paint, antifreeze, diesel fuel, and lubricating oil. There has been no reporting made to comply with this regulation.

* The Texas Community Right-to-Know Act requires reporting of any hazardous chemicals present in excess of 55 gallons or 500 pounds. The list is to contain information including the chemical name and the common name, the nomenclature used in identifying the chemical name, and the work area where the hazardous chemical is normally stored or used. There has been no listing provided in compliance with this requirement.

CONCERN: See MC.5-5.

E. OPERATIONS

Operations is assigned the principal responsibility for implementing the line control safety program. They are tasked to work safely, and are responsible to assure that safety hazards are detected, reported, and corrected in a timely manner. These responsibilities are conscientiously addressed. However, significant deficiencies regarding identification of potential hazards, inadequate operating procedures, and insufficient training were observed and are documented in this and other sections of this report.

Operations personnel displayed a genuine desire to work safely, but this is undermined by the lack of safe operating procedures and a formal training program. A sampling of operating procedures found the procedures to contain errors that could lead to unsafe operations. There is no formal testing of job skills and knowledge, and no formal certification of operations personnel to verify their competency.

Housekeeping, shift turnovers, and communications within the site are generally good. Reports of incidents and accidents are communicated to NOLA in accordance with operating procedures. Near misses and precursors to potential accidents are not being reported and addressed.

E.1 CONDUCT OF OPERATIONS OP.1

PERFORMANCE OBJECTIVE: Operational activities should be conducted in a manner that achieves safe and reliable facility operation.

FINDINGS:

- o New Orleans personnel initiate a 7:30 a.m. conference call to all site managers Monday through Friday to discuss the operations and impairment report that is telefaxed to the New Orleans office. A New Orleans supervisor is designated as a duty officer (DO) during nonworking hours. The DO is provided with a pager and cellular phone and is notified by site personnel of unplanned events.

- o Based upon observations and interviews of employees performing many duties (Control Room operator, transferring oil into a cavern, obtaining readings at caverns, operating triplex pump, operating vacuum truck, washing down unit) it is concluded that the Operations Department hourly employees were generally knowledgeable of their duties, followed procedures, and worked safely. However, some instances of employee non-conformances were observed and are reported in this and other sections of this report.

- o Operations managers document daily instructions to shift supervisors. This is accomplished by means of the West Hackberry form, "Instructions to Shift Supervisors" and the Big Hill, "Night Order Book".

- o Safety meetings are held monthly at both locations and include a topic provided by the site safety administrator in addition to subjects concerning operational safety.

- o The shift supervisors demonstrated a clear understanding of their responsibilities and duties. They are knowledgeable about various job procedures and perform them in accordance with established requirements.

- o An authentication code was used randomly at West Hackberry by Security personnel to permit operators to enter and leave the fenced cavern areas. The quick request by Security for authentication was matched by the quick response of the operator. The rapid exchange provided evidence of its frequent use by personnel.

- o Operators at both sites use a flow diagram to determine which valves are to be opened and closed at the caverns. The shift supervisor and Control Room operator indicate on the diagram which valves are involved in the flow change. After the operator has made the flow change, he initials the flow diagram and returns it to the Control Room.

* There are indications that not all safety hazards are identified in the procedures and, at times, adherence to procedures is lax. This is indicated for example, by the failure to ground vacuum trucks. A team member found an ungrounded contract vacuum truck in operation despite the shift supervisor verbally telling the driver to ground the truck and it is stated as a requirement on the SWP. Section OP-5 describes vacuum truck operations in more detail.

CONCERN: See IH.4-1.

E.2 OPERATING PROCEDURES AND DOCUMENTATIONS OP.2

PERFORMANCE OBJECTIVE: Operating procedures and documents should provide appropriate direction and support to the safe operation of the facility.

FINDINGS: * Operations and impairment information is telefaxed to New Orleans. The facsimile sheets are not standardized which results in the sites furnishing different data. For example, not all telefaxed sheets provide the site security level. Information cannot be easily referenced from the telefaxed sheets due to different form configurations.

CONCERN: See IH.3-1.

FINDINGS: o The facilities have operations manuals consisting of two volumes which are relied upon primarily as reference material. Operations procedures are readily available for normal operation. (However, see PP-5 with respect to emergency response manuals.) Informative logs are maintained by the shift supervisor and Control Room operator.

* It is evident that a considerable amount of time has been devoted toward developing policies and procedures but some do not reflect a thorough technical review as shown below.

* Two operating procedures were reviewed by a team member and found to contain numerous errors despite having been reviewed by personnel from several departments prior to Division approval. The published procedures indicate that the review process was inadequate. Some areas of concern are:

- Operating Procedure 220P-1, Safe Work Permits, November 8, 1988.

(1) Page 4, IIIC, reads: "The BPS supervisor/foreman/BTR responsible for having the work performed must originate the SWP by completing Sections I, II, and III ...". Sections II and III are precautionary sections which are of the type completed by Operations personnel at most industrial locations. The person responsible for having work performed may be outside the Operations Department.

(2) Page 7, A1, states that a lock and tag are required. However, page 9 C1, raises the question of whether there is a mandatory lockout and tagout policy because it discusses removing a lock or tag to operate equipment. Also, page 24, seems to provide a lock or tag option by stating: "if

equipment is to be locked or tagged out". Likewise, the title LOCKOUT/TAGOUT implies lock and/or tagout.

(3) Page 8, B.2, calls for a personal safety lock for each employee working on the equipment. Each employee is to sign the SWP in Section IV as they remove their lock; the form has space for only one signature.

(4) Page 11, B, second paragraph, describes the requirement of having a minimum flow rate while hot tapping; however, the first paragraph states the hot tap may need to be delayed until the unit or equipment is out of service, i.e., no flow rate.

(5) Page 16, 8b, states that blind flanges must be bolted to open line outlets (presumably, the vessel nozzle or a pipe attached to the nozzle) to prevent flow into vessels, but this ignores the possibility of fluids/gases flowing from the separated line toward the vessel-

(6) Page 19, the subject of communications equipment is not on the list of items to be considered for a vessel entry.

(7) Many SWPs in industry require the signature (and have space allocated on the forms) for the person making the gas test and for the signature of a craftsman (welder, pipefitter, etc.) acknowledging his responsibility to perform safely. The new SWP does not have these signature lines.

Operating Procedure 220P-44, Crude Oil Tank Preparation and Cleaning Operations, June 1, 1987.

(1) Page 4, B6, discusses descending onto covered floating roofs in service. Descending upon covered floating roofs is extremely hazardous and is not normally undertaken. A statement does not exist in the procedure which would suggest the job be delayed until the tank has been emptied and cleaned.

(2) Page 6, E, Control Source of Ignition does not mention the need to bond/ground the air mover so that the static charge, which is created by the high flow rate through the air mover, is discharged.

(3) Page 9, H2, the paragraph does not mention thermal relief valves. Of particular interest is the thermal relief valve on the blocked-in portion of the line which relieves to the tank nozzle piping. The relief valve will discharge oil into the tank nozzle piping. During cleaning jobs, this is the area where personnel are working. The small diameter relief valve piping is usually parted during tank entry rather than relying upon the small diameter valve in the line to provide a positive shut-off.

(4) Page 9, I1, mentions that "vapor laden air will be exhausted at the top of or above the perimeter tank wall". Possibly the intent is to discharge vapors at or above the dike wall, not the tank wall. If vapors were discharged at the top of the tank wall, some of the vapors might be drawn into the tank by the air mover.

(5) Page 9, J1, discusses initial gas testing "at the manway opening where vapors are being exhausted". It does not mention that testing is conducted prior to energizing the air-movers so that an accurate reading is obtained. Preferably, all gas tests are conducted while the air movers are off.

(6) Page 12, VA, states that hydrocarbon vapors shall be 0% of the explosive range which is incorrect because 0% of the explosive range is 100% of the lower flammable limit. That would be a hazardous condition for entry. It should read 0% of the lower flammable limit.

(7) Page 13, B, mentions a "manhole watcher". The "watcher" does not watch the manhole but is there to assist personnel working inside the tank. He is usually referred to by industry as the "standby person". This procedure and the SWP procedure use the terms "manhole" and "manway" interchangeably. Industry uses the term "manway"; "manholes" are the horizontal openings found in roadways.

CONCERN: See MC.1-3.

E.3 FACILITY STATUS CONTROLS OP.3

PERFORMANCE OBJECTIVE: Personnel should know of the status of the systems and equipment under their control and ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

FINDINGS:

- o Operators make their rounds at 2 or 4 hour intervals, depending upon the operations at the particular cavern. At West Hackberry, they inform security of their intended entry or exit at cavern gates.

- o Operators usually communicate process information by two-way radios.

- o Operators abide by operating procedures and policies. Typical observations were: (a) Control Room operators sought guidance from an Emergency Procedures manual during an emergency drill at both sites, and (b) operators at West Hackberry followed the instructions of the shift supervisor and operations manager regarding precautions to be taken during a hot tap job.

- o Control Room operators take hourly readings promptly. All readings are recorded. Megatek computers in the Control Room scan pressures, flows and are used to make process changes. At West Hackberry, Control Room data are recorded daily on four 24-hour videotapes and then put into storage. After 90 days, the tape is removed from storage and new data recorded over the old. Big Hill will use an event printer to review operations during the previous 30 days.

- o Operators use triplex pumps to pump out of the cavern to reduce cavern pressure. At West Hackberry, an operator stays at the triplex pump during the entire operation. While making an observation at one job site, it was noted that the operator had personal protective equipment and a two-way radio.

- o Site personnel at the daily planning meeting discuss when equipment will be ready to perform maintenance safely. The meeting is attended by Operations, Maintenance, and other interested personnel.

- o SWPs are visible at job sites. The SWP holders at Big Hill are undersized and do not provide protection from the weather. This damages the form and makes it illegible.

- o The Lockout/Tagout procedure is documented at both sites. A computer at West Hackberry prints the location of each

existing in-service lock, its location, and the name of the person attaching the lock. No discrepancy in the lockout log or procedures was found.

- o It is recognized that there are equipment marking deficiencies as stated in TS-6.

CONCERN: None.

E.4 OPERATIONS STATIONS AND EQUIPMENT OP.4

PERFORMANCE OBJECTIVE: Control stations and facility equipment should effectively support facility operations.

FINDINGS:

- o The proximity of the Control Room and shift supervisor's and Operations Manager's offices at both sites promote efficient communications.
- o Communications equipment is adequate and extensively used at the sites to achieve safe and effective operations. Operators carry portable battery operated two-way radios and use them frequently.
- o The relatively small size of the sites allows for easy one-on-one access to all employees for meetings and other discussions.
- o Piping contents were labeled clearly at both sites. The West Hackberry Control Room was somewhat disorderly because of ongoing computer circuit verification.
- * Some deficiencies (ie, facility equipment, etc.) are mentioned in the maintenance and fire protection sections of this audit.

CONCERN: See MC.5-1.

E.5 OPERATOR PERFORMANCE OP.5

PERFORMANCE OBJECTIVE: Operator knowledge and performance should support safe and reliable operation of the equipment and systems for which he is responsible.

FINDINGS:

* Big Hill is developing an outline for operator training. They have designated course requirements, as defined in 4BHP-88-018, dated February 2, 1988. West Hackberry has not fully defined their course requirements.

* There are no criteria or controls for completeness or adequacy of training. Training is through on-the-job training (OJT) with an experienced operator for an unspecified period of usually one or two weeks, except for the Control Room operation. Trainees work alongside experienced Control Room operators for 3 to 4 weeks at West Hackberry and for a longer, unspecified period at Big Hill. No formal tests are given to determine if a trainee is qualified to advance to operator status and work alone. Supervisors question the operators to determine their competence. However, there is no assurance that trainees are asked the same questions. No letter is filed or signed by anyone stating that employees are qualified for another position and are allowed to work independently.

* The NOLA Operations Manager is aware that there is no formal training. The Director of the Operations and Maintenance Division is aware that there are "no SPR criteria for determining and documenting level of training and the minimum training requirements for each job classification" as per a document furnished by the Director. His division has developed a training plan for the SPR which is used as the basis for training requests submitted by site managers. SPR has one full time training specialist. The specialist is limited by time as to the assistance he can furnish.

CONCERN: See MC.6-2.

FINDINGS:

* At West Hackberry, vacuum truck operations are included in the operations manual. No safety-related loading instructions are included.

* Big Hill has a Site vacuum Truck Procedure, 4BHP89-030, which became effective January 3, 1989, requiring the use of a ground wire in Section E (Positive Pressures) and Section F (Discharging); it is not required while the truck is used in the vacuum position (Section D). A ground wire should be specified in all three sections.

o At West Hackberry, one operator was observed not using the ground cable on the vacuum truck. The condition of the ground

cable indicated it had not been used for some time. Two contract vacuum trucks at Big Hill were not properly grounded. It should be noted there are other safety considerations besides grounding for vacuum truck operations.

- o A contract vacuum truck operator was told to ground his truck prior to its use. A later visit to the job site by a team member, while the vacuum truck was in service, revealed that the driver had not grounded the truck.

- * Vacuum truck safety procedures were found to be inadequate at both sites. There is a need for detailed safety instructions and more vigilance toward assuring a proper ground at the job site.

CONCERN: See MC.1-3.

FINDINGS:

- * At West Hackberry, two operators are assigned to assist the shift supervisor. One operator performs SWP site inspections and the other operator handles clerical duties associated with the permits and lockout-tagout systems. The second operator also performs some job site inspections. The sites are not consistent in their approach because Big Hill shift supervisors have no such assistance. Based upon the manpower assignments above, there is reduced capability for verifying compliance with SWP's at Big Hill. In addition, the Big Hill site safety representative, who is expected to make site inspections per 220P-1(SWP), is the shift supervisor who has other assigned duties. At both sites, the site safety administrator checks a job infrequently.

- * The vacuum truck operator's violation of safety instructions as previously noted, demonstrates a lack of procedural compliance verification.

- * There is no assurance that a job site will be visited by Operations personnel to determine whether there is compliance with SWP requirements.

CONCERN: See MC.1-2.

E.6 SHIFT TURNOVER OP.6

PERFORMANCE OBJECTIVE: Shift turnovers conducted for each shift station should ensure the effective and accurate transfer of information between shift personnel.

FINDINGS:

- Shift turnovers provide for an orderly transfer of information. The shift supervisors discuss the status of operations for a sufficient time with their replacement at the supervisors desk. Operators going off shift do not rush to leave the premises, but instead stay long enough to provide the necessary information. The arriving operators check their two-way radios for operability. The shift supervisor and Control Room logs provide information about process and equipment changes during each shift.

- The Control Room operator turned over the Control Room console to his replacement in accordance with procedures. During the simulated emergency at West Hackberry, the Control Room operator handed the initial simulation scenario, which was pre sent to him by a team member, to his shift replacement who arrived during the exercise. This quickly brought the relief operator up to date. The relief operator also read the log which was recorded during the exercise as part of the shift turnover of information.

CONCERN: None.

E.7 HUMAN FACTORS OP.7

PERFORMANCE OBJECTIVE: Human factors considerations should be evident in the design and operation of systems, controls, and displays to facilitate the observation and interpretation of instruments, alarms, and other information, and the operation and maintenance of equipment.

FINDINGS:

- o Process piping is well marked with large labels indicating crude oil or brine.
- o Work platforms are sufficiently sized to allow personnel movement with hand tools.
- o Yellow and black marking tape on tripping hazards is evident throughout the site.
- o Control Rooms are well lighted. Controls, communications equipment, and writing surfaces are at comfort levels.
- * The security package for the Big Hill Control Room has not been installed. Although the two doors to the room from the hallway are locked during the day, access is easily gained through a door which opens from the Control Room into the Administrative area.
- * The shift supervisor was observed smoking cigarettes twice in the West Hackberry Control Room despite NO SMOKING signs posted on the wall. one other employee was also observed smoking in that Control Room on another occasion.
- * The doors to the West Hackberry Control Room and shift supervisor's room have signs stating that an alarm will sound if the door is opened; no alarm sounded while the door was left open for hours. Heavy traffic to those rooms does not appear to justify defeating the alarms. Indications were that anyone could have entered the Control Room lobby and the Control Room during the day without being challenged. In one instance, a team member opened a door which was supposed to be locked, entered a clerical area, and returned through the same door to the Control Room. Proper control of access and keys for the Control Room is not practiced.
- * It was observed that no one could exit the rear door of the West Hackberry Control Room in the event of a fire since the door is normally locked with a key.

CONCERN: (OP.7-1) (H2/C2) The safety and integrity of the West Hackberry Control Room and its protected systems (H2/C2) are lax.

F. MAINTENANCE

The maintenance assessment focused on safety aspects of the physical condition of the plant sites and the applicability and clarity of maintenance procedures. The team made brief inspections of equipment operated and maintained by BPS, as well as equipment and site facilities under direct contract to DOE for construction.

General, corrective and preventive maintenance is performed with good results only on identified items and deficiencies in a timely manner using written procedures approved in New Orleans. Preventative maintenance is scheduled by ILS through an automated maintenance system. Documentation of repairs and failures is recorded by the sites in the Integrated Logistics System (ILS) computers. Failure analyses are made in New Orleans for proper maintenance and for special studies through the Reliability, Availability and Maintainability (RAM) system. Maintenance history and the Critical Items List (CIL), as well as a critical spare parts list, are readily accessed and monitored through all ILS computer terminals. Changes are controlled by the NOLA RAM Assessment Board. However, significant and potentially hazardous conditions are resulting from faulty procedures. Furthermore, a lack of technical expertise at the site has led to a failure to identify latent, but potentially hazardous conditions.

Many of the written procedures used by maintenance personnel are without adequate safety guidance. Some omit entirely the necessary safety precautions that should be taken during the course of performing maintenance work. The needed safety information could be accessed from available documents and assimilated into a single, more usable procedure or manual.

Maintenance personnel have been trained, tested, and appropriately qualified, to perform maintenance work. Maintenance personnel are responsive to safety issues when they have been identified. Immediate corrective action was initiated on most of the deficiencies identified by the team.

BPS is organized with a multi-department approach to their Line Control Safety Program complemented by staff support. Annual Management Effectiveness Audits (MEA) and semi-annual Safety Inspections are conducted by NOLA in addition to site conducted Zone and Safety Monitor inspections. Maintenance participates at all levels and the MEA is coordinated by New Orleans Maintenance. Identification and correction of safety deficiencies are part of the maintenance function. However, significant and potentially hazardous safety deficiencies were observed by the team leading to a concern that appropriate technical safety expertise is absent and/or overview and accountability are inadequate.

F.1 FACILITY MATERIAL CONDITION - MA.1

PERFORMANCE OBJECTIVE: The material condition of components and equipment should be maintained to support safe and reliable operation of the facility.

FINDINGS:

* Mechanical and electrical systems were serviced under Preventive Maintenance (PM) and Corrective Maintenance (CM) programs that provided for good and reliable operations of the sites. Some equipment related deficiencies were noted despite these maintenance programs.

* Immediate corrective action was initiated on most of the identified deficiencies.

* Caverns 108 and 112, including the DOE workover rig and associated equipment, were reviewed at West Hackberry. Conditions noted which could adversely affect the safety of operations were as follows:

  - A 1/2-inch, 1/4-turn (quick open) valve was open ended. Also, a socket weld valve was looking up with no provision for inserting a plug.

  - Insulating flanges (cathodic protection) were covered with a sealed protective band that could hold moisture and provide electrical continuity which would defeat cathodic protection.

  - Power tong hydraulic oil hoses were damaged and deteriorated. These hoses could rupture under pressure and result in a fire and personnel injury.

  - The power tong was tied back to a derrick structure brace with a wire rope loop and clamp. A tuck and clamp was used on the tong clevis. Both of these practices can significantly reduce wire rope capacity.

  - The catline, including top layers on the drum, was not adequately lubricated to prevent deterioration of the exterior wire and hidden interior core. Both conditions would severely reduce the rated capacity of the wire rope.

  - Pipe rack control station house support was broken and sitting at a dangerous angle. Collapse of the support could seriously injure the operator.

  - Wire rope slings on the external test unit (sitting on rig floor) showed deterioration rust, broken wires, and kinks. The capacities of these slings were significantly less than design ratings.

* Caverns 103 and 110, including Pride Petroleum Services contract workover rig number 555, were reviewed for material condition at Big Hill. Conditions noted which could adversely affect the safety of operations were as follows:

  - One set of guylines were connected to the anchor with two field fabricated coupling plates about 1/4-inch thick. Two of the rig's guylines were connected to an anchor with sheaves of unknown rating and manufacturer. The rig did not have documentation showing the equipment was adequate for the service.

  - The rig engines did not have spark arrestor mufflers or exhaust manifold protection from contact with flammable fluids.

  - The hydraulic actuator skid was located at ground level within the cavern diked area as was a transformer and other electrical equipment. At that level, the equipment is subject to flooding from rain or crude oil spills.

  - Several damaged electrical fittings were noted. Loose electrical wires were also found at well sump #110A.

  - Several BPS (workover) wireline slings were inspected and conditions adversely affecting safety were noted, such as no identification or rating; one sling was field fabricated with improperly installed clamps.

* Conditions noted at the West Hackberry BPS contractor (TABS, Inc.) cherry picker, which could adversely affect the safety of personnel and equipment were as follows:

  - Anti-two block safety shutdown system was broken. The blocks were observed in a two block squeeze that invariably damages and sometimes breaks the wire rope.

  - The dead line was observed to be deformed (wavy). Wire rope deformity unevenly distributes the stress between the strands and causes wire rope failure below it's rated capacity.

  - The boom angle indicator was broken. Without this device the operator is unable to read the cranes load chart and determine load handling capacity.

- A recently used, badly kinked wire rope sling was lying on the ground under the hook. The capacity of a sling in that condition is significantly less than the rated capacity and cannot be safely estimated.

* The anti-two block system on one of the Big Hill BPS contractor (TABS) cherry pickers was not operative. This could adversely affect safety of personnel and equipment. The other TABS cherry picker had an operative anti-two block shut down device.

* Conditions noted at the DOE contractor (WOMACK) construction cherry picker at West Hackberry which could adversely affect the safety of personnel and equipment were as follows:

  - A section of load line was squirrel caged.

  - There was no anti-two block device on the load line.

* One of the lightning (static mast) protection poles in the main substation at Big Hill was vibrating excessively from the wind.

* The ground wire to the 4160 volt motors at the Big Hill Raw Water Intake Structure (RWIS) is spliced (this was confirmed by BPS). Spliced ground wires were also found at the main facility. The National Electric Code (NEC) requires a continuous ground conductor.

* The electric cable to the pig hoist crane at West Hackberry was pulled partially out of the box (unclassified connection). The chain on the hoist was rusty and the safety latch was broken.

* At Big Hill at the back of the maintenance warehouse, a complete three-phase set up of conduit was open ended and not properly terminated, at ground level. In one conduit, there were three large electrical cables cut even with the surface of the conduit. Site personnel witnessed the disconnect of these cables from the source.

* Vehicle bumper guards were not in place at 4160 volt transformer installation numbers VHTX33 and 34. These large transformers are adjacent to a plant road and parking area between two main buildings at Big Hill.

* Dielectric mats are not always being used. Dielectric mats were used on part of the floor in the Big Hill Brine Disposal Load Center building but the floor was bare in places. In addition, the building was not locked. There were no dielectric mats used in the Crude Oil Injection Load Center or outside, such as at the 480 volt circuit breaker boxes in the covered equipment storage shed and trailer mounted portable generating units.

The remaining findings relate to West Hackberry.

FINDINGS:

* There were valve stem and operating wheels in the High Pressure Pad manifold area which were partially below the drainage water level.

* The conduit to the below ground cathodic protection bed at the back of one of the Low Pressure Pump Pads was damaged.

* The diesel tank at the Black Lake fire pump station did not have a bumper guard or diked area. Neither this tank, the gasoline tank, nor the fuel tanks on the other side of the road have appropriate signs warning against having ignition sources within 50 feet.

* The bilge in SPR boat No. 3 was not adequately cleaned after a gas tank leak. This resulted in a noticeable amount of gasoline fumes emanating from the bilge area. This condition was a fire hazard and regularly exposed the operator and passengers to noxious vapors.

* The flame arrestor on the underground sump vent at the West Hackberry No. 2 valve station did not appear functional. A malfunctioning flame arrestor could result in an explosion in the sump from surface ignition by lightning or other source.

* The insulating flanges on WHB pumps 106, 107, and 108 were not installed properly. Electrical continuity probably existed and caused unplanned metal loss from the protected system. Such loss could result in unexpected premature failure that would adversely affect the safety of operations.

* The electrical ground on low pressure pump pad numbers 2 and 4 was connected to a metal bar that was connected to the motor. The number of connections was not minimized as to reduce the probability of ground failure and electric shock to plant personnel.

* The sump pump near the oxygen scavenging inhibitor system was out of service but was not removed. There were bad electrical

connections and some flange bolts were missing. Open conduits in classified areas can transport flammable fluids to ignition sources.

* Conditions noted at West Hackberry on diesel vacuum trucks which could adversely affect safety of personnel and equipment were as follows:

  - The seal plugs were missing from the rear brake boosters. This could result in brake failure or malfunction. One support strap was completely rusted off of the air tank; the other strap was rusty.

  - The West Hackberry vacuum truck was not equipped with a grounding cable to prevent the discharge of static electricity during pumping operations. The Weeks Island truck was equipped with a cable.

* The slop oil tank normally contains crude oil, sludge and various other flammable sump products along with an empty void in the upper part of the tank. The tank top was equipped with a covered vent and a flanged opening used for gauging. There was no pressure-vacuum valve and flame arrestor on the tank vent. The vapors were not remotely vented and there was no provision for insuring that a combustible mixture was not present in the tank. These conditions could result in an explosion, fire, or injury to personnel and/or damage to nearby equipment.

* Conditions noted at the RWIS which could adversely affect safety were as follows:

  - Loose electrical wires were exposed from the end of an open conduit at a location where a building was once located. This inactive electrical system had not been sealed or completely removed.

  - The check valve on the back water flush pump had several broken bolts and/or missing nuts.

CONCERN: (MA. 1-1) (Category II) (H1/C2)

Numerous hardware, equipment, and material safety deficiencies are not being detected, reported, and corrected by the maintenance group.

F.2 CONDUCT OF MAINTENANCE - MA.2

PERFORMANCE OBJECTIVE: Maintenance should be conducted in a safe and efficient manner to support facility operation.

FINDINGS:

- o Maintenance Requirements are documented in the Maintenance Management Plan (D506-01154-09) developed by NOLA Operations and Maintenance directorate. It contains inspection requirements.

- o In general, maintenance activities were adequately supervised and performed by qualified personnel. Site maintenance activities were coordinated with Project Planning and Control (PPC), and with operations at the time of execution, through the SWP program.

- o General maintenance practices include tool inspection and control, housekeeping, lock and tagout procedures, and occupational safety.

- * Maintenance personnel were involved directly in the identification of safety deficiencies through individual contributions, Maintenance Effectiveness Audits conducted by New Orleans and through assigned site Safety Monitors. Maintenance Effectiveness Audits were more progressive and effective in procedural areas than in identifying physical deficiencies. Neither the maintenance controlled hazard identification checks nor inspections by others were adequate to eliminate the numerous material deficiencies which were identified by the team.

- * A set of formal work procedures is provided by PPC for Corrective Maintenance and followed in the normal course of job execution. These procedures were supplemented and reviewed, as necessary, by concerned site groups, such as operations, quality assurance and technical assurance. In many instances, the procedures lacked adequate technical safety guidance.

- * The Maintenance Inspection Program requires only monthly zone inspections, annual effectiveness audits, and QA document audits. No safety criteria are given the inspection program.

CONCERNS: See MC.1-1 and MC.5-4.

FINDINGS:

- * Maintenance training for site personnel includes technician experience, on-the-job training, and specialized training. NOLA does not have a formalized training program for the sites. Examples of maintenance training are as follows:

- Operators of lift trucks, backhoes, cranes, and similar equipment were trained and qualified as operators.

- Electricians have been trained in maintenance of electrical equipment. A large amount of this training has been through schools set up offsite and onsite for the special electrical systems.

- Instrument personnel have been trained in instrumentation work.

- Mechanics have been trained in specialized areas. Training has included vibration analysis, wellhead gate valves, pumps, and laser alignment.

- Other maintenance personnel have no formal training program. They are trained mostly through on-the-job training; personnel are expected to keep a log of their training and work history. Job performance is evaluated semi-annually.

- Site management personnel, through first-line supervisors, were given Hazard Recognition training in early 1987. Similar training has been given to a few other personnel. This training has not resulted in an awareness of hazards such as those associated with operating, maintaining, and passing in the near vicinity of the high, higher, and extra high voltages. Examples are included in the MA.1 section of this report.

CONCERN: See MC.6-2.

FINDING: * BPS workover rig personnel are trained at formal well control schools. Special training is necessary to control potential unplanned pressure release or fluid flow to the atmosphere safely. Contractor personnel, furnished with contract workover rigs, are not required to have this training. Onsite safety procedures do not mitigate this lack of training. DOE Environmental, Safety and Health Manual, Chapter 5, paragraph 5B.9(i) requires training for well control of all personnel involved.

CONCERN: (MA.2-1) (Category II) (H1/C1) Control mechanisms are lacking to assure that BPS workover contractor training meets job requirements.

F.3 PREVENTIVE MAINTENANCE - MA.3

PERFORMANCE OBJECTIVE: Preventive maintenance should contribute to optimum performance, safety, and reliability of systems and equipment important to facility operation.

FINDINGS:

- o A functioning and documented preventive maintenance (PM) program initiated and controlled by NOLA has been implemented. The procedural steps to be taken are described on the Maintenance Requirement Cards (MRC). A schedule from New Orleans is forwarded to the site in advance of the required performance date.

- o Interim site-specific MRCs have been established at Big Hill to cover most of the items on which permanent MRCs have not been established. All MRCs are approved and controlled by New Orleans. Permanent New Orleans-generated MRCs were not available because of the lack of vendor information on Phase II construction items.

- o The PM program covered from 1,000 to 1,500 items per month and had an expected ontime completion rate of 95 percent. The completion rate is normally 94 to 100 percent.

- * Items not completed required justification to site and New Orleans management. However, there was no procedure in place to ensure that weekly or monthly maintenance requirements were not omitted during consecutive periods. This lack of control also applied to quarterly and semi-annual requirements when the preventive maintenance procedure was delayed repeatedly for operating purposes.

- o Minimum requirements for inspecting workover rigs are established by New Orleans. Workover rigs were inspected, using a checkoff list, by the site rig foreman after each rig up. The DOE workover rigs were inspected annually at West Hackberry and every three years at Big Hill by a contractor qualified to certify the rig (derrick) safe to use under design load conditions. DOE rigs receive a complete overhaul and inspection (including NDT) of the derrick every six years.

- * Immediate corrective action was initiated on most of the deficiencies identified by the appraisal team.

- * The job site inspection checklist for workover rigs did not adequately reflect all safety aspects related to the proper operation of a workover rig such as the condition of wire rope, location of ignition sources, and flammable materials. For example, deficiencies noted on the workover rig at West Hackberry are as follows:

- Several hydraulic oil leaks were observed. There was an accumulation of oil on the rig decks.

- Accessory pumps and compressors were located adjacent to the wellhead and alongside the rig base. These units had rubber fuel lines, bare exhaust manifolds, spark arrestor mufflers, and open starter switches, generators, and starters.

- The main rig engines had spark arrestor mufflers but no protection for the exhaust manifolds and the turbo chargers.

- A 1,000 gallon diesel tank was located next to the rig base.

- Construction, Drilling, and Workover Safety and Health Program, Chapter V, requires fire prevention and protection measures to include restricting ignition sources to a minimum of 100 feet from the wellhead.

* The pig trap PM procedure fails to require ASME lock and bleed devices on the hinge closure to be checked. The West Hackberry 42-inch crude oil lock and bleed device was found broken.

* The main substation at West Hackberry was powered by 69,000 volts. The primary at Big Hill was 138,000 volts. The raw water site was powered by 34,500 volts. Most of the process motors, switch gear, and motor control centers were 4,160 volt units. Hazards associated with these elevated high voltages missed or not subsequently corrected during site inspections include:

  - An onsite program to routinely inspect rubber gloves for electricians was not in place.

  - The main switch gear buildings next to the 69,000 volt substation at West Hackberry have experienced considerable water leakage in the past. Experience shows that starters have blown up in the industry because of this and not necessarily at the same time the water entered the building.

- The floor had some rusty spots. The 5,000 volt floor insulation pads were rolled up in both buildings until floor repairs are made. The painting crew (non-electrical personnel) was scheduled to work inside the building on the bare floor under the surveillance of an electrician without de-energizing the building. Any other work done in the building before the floor is refinished would be done on the bare steel floor that has the potential of exposing workers to electrical shock.

- The painters work on the outside of the building (between building and substation fence at West Hackberry - not on top) without an electrician escort and without de-energizing the building. There is a potential for electric shock or explosive injury while the painters are nearby or touching the building or related equipment. Without malfunction of equipment and protective devices, the building is designed to prevent electrical shock to a person. However, electrical equipment and insulation are susceptible to failure.

- In the main part of the West Hackberry facility (High Pressure Pump Skid) where the 4,160 volt pumps and motor control centers are located, there are virtually no high voltage signs and there are no protection barriers. The existing high voltage signs are small and do not indicate the amount of voltage. These same conditions exist at the raw water intake structure.

- Although high voltage signs were generally posted at Big Hill, some motors and switch gear did not have signs and some did not show the voltage.

- On December 7, 1988, at the West Hackberry 4,160 volt motor control building, a majority of the control panel doors were wide open and unattended. Open panel doors increase the potential for electric shock.

- Water from recent rain was found on the floor of the Emergency Generator Building at Big Hill. Also, the only fuel shut off valve was manually operated and located against the building wall. Entry of water into the building could cause damage and explosion of electrical equipment.

CONCERN: See MA.1-1 and MC.1-3.

FINDING: o As evidenced by the deficiencies noted by the appraisal team in procedures, material condition and personnel technical safety awareness, the PM program is ineffective in demonstrating technical safety awareness as noted in preplanning for hazardous work, lack of adequate safety precautions, and lack of identification of safety problems observed by the team.

CONCERN: See MC.1-1.

F.4 MAINTENANCE FACILITIES, EQUIPMENT, AND MATERIAL MA.4

PERFORMANCE OBJECTIVE: Facilities, equipment, and material should effectively support the performance of maintenance activities.

FINDINGS:

- o Maintenance facilities include an enclosed work shop, several designated open storage and work areas, enclosed tool storage, inspection area, motorized equipment, and electrical and instrumentation devices.

- o The larger equipment was supplemented by rental equipment. There was an adequate stock of repair parts and expendable supplies.

- * Some manufacturer certification and capacity tags remained on the wire rope slings in the tool room but many tags did not. There was no system to trace a wire rope sling without an identification tag back to the purchase order. The inspection/ rejection criteria were wrong on both the wire rope slings and the nylon slings. Several of the wire rope slings in storage for use at West Hackberry were unsatisfactory for service.

- * Both welding rod storage boxes in the tool room at West Hackberry were turned off and not heated. The welding rod box at Big Hill was operating, but numerous open boxes of welding rods were observed outside the heated box. Welding rods that are not maintained in a heated box from the time the sealed can is opened absorb moisture which damages the flux. Use of damaged rods was not controlled; such use would be a violation of good practice. An unsafe weld could result.

CONCERN: See MC 5-1.

F.5 WORK CONTROL SYSTEM - MA.5

PERFORMANCE OBJECTIVE: The control of work should ensure that identified maintenance actions are properly completed in a safe, timely, and efficient manner.

FINDINGS:

- o Maintenance work is performed through Integrated Logistic Support (ILS) procedures established and controlled by New Orleans. All requests for work are coordinated through ILS procedures. A work order is initiated which routes to the Project Planning and Control (PPC) for definition and documentation of the procedures to be used.

- o Quality Assurance (QA) inspection hold points (as established by site QA organization) are included in work order packages. The work order package also contains special instructions for hazardous work and testing requirements.

- * The PM procedures are documented on maintenance requirement cards (MRC) controlled by New Orleans. These procedures do not reflect adequate safety precautions. Examples are presented in Section six of this report.

CONCERN: See MC.1-3.

F.6 PROCEDURES AND DOCUMENTATION - MA.6

PERFORMANCE OBJECTIVE: Maintenance procedures provide appropriate directions for work and should be used to ensure that maintenance is performed safely and effectively.

FINDINGS:

* Maintenance procedures are reviewed and approved at all organizational levels. The flow of documents reaches all concerned groups of the organization. In general, procedures are developed, revised, approved in New Orleans and validated at the site during use. Installation documents are kept up to date (as- built) and copies of current procedures are readily available. Most as-built (redline) drawings for Phase II construction at Big Hill have not been released by the construction contractor and are not readily available at the site.

o Welding procedures have been developed and are followed for all sizes, grades, and thicknesses of pipe used at the facility. New Orleans personnel were in the process of updating the procedures.

* Welders were required to be formally certified using the established procedures. Their welds were checked by nondestructive testing (NDT) using the same requirements established for the original construction. These procedures could be negated by the poor condition of welding rods noted in section MA.4 of this report.

* Thermal relief valves have been installed on above ground piping that can be isolated with valves. Block valves were installed underneath relief valves. These block valves were not sealed in the open position because a written procedure from New Orleans requires the block valve to be closed when fluids are pumped through the line. A thermal relief valve was found blocked at Big Hill under static flow conditions. The thermal relief valves were inspected, serviced, and tested annually.

o As-built drawings are maintained for changes made by the Maintenance department. The Engineering Change Proposal (ECP) procedure does not permit closeout of a work order until the proper drawings have been redlined for change and sent to Engineering Design and Analyses (EDA) in New Orleans.

* The new API crane at the West Hackberry offsite raw water intake structure had not been given an initial load test as a unit, as required by OSHA regulations.

* All high pressure raw water pump motors at Big Hill had been removed and installed on the low pressure raw water pumps and

the crude oil pumps. Although this arrangement is now projected to be long term, only temporary procedures have been used to secure the disconnected open 4,160 volt conduit and wires. These procedures did not include short circuiting the feeder lines to ground at the terminal to prevent unintentional charging of the wires during maintenance, annual turnarounds, etc., or placement of cables in a rigid conduit type enclosure consistent with wiring practice at the motor prior to exposure of the cables. The procedures included lockout/tagout at the source.

* The pedestal mounted crane at the Big Hill Raw Water Intake Structure was load tested when it was installed in 1987, but it does not have an anti-two block device on the loadline.

* There are instances where neither the New Orleans nor the site procedure is clear and/or precise. Several of the inspection and maintenance procedures reflect a lack of experienced, technical safety expertise that is specific to the item covered. Examples are listed as follows:

  - BPS/NOLA wire rope procedures require a check for damaged, frayed, or broken strands. This statement is inadequate for inspection criteria and rejection of unsafe wire rope. Site tool room procedures were in more detail, but unclear regarding rejection. No adequate criteria were presented for training operators, safety monitors, and inspectors to perform the inspection correctly. There is a DOE Rigging Manual as well as other industry data which could be reviewed and appropriate information assimilated into a usable document.

  - There is no requirement in the BPS/NOLA Preventive Maintenance (PM) procedures to check the static electric bonding system on the vacuum truck.

  - No special precautions are listed in the BPS/NOLA Preventive Maintenance/Corrective Maintenance (PM/CM) procedures to alert a mechanic or others to check for energized external casings, coverings, etc., before touching. Insulation deterioration or other failure could cause external surfaces to be energized.

  - Maintenance Requirement Cards (MRC) for electric motors do not require a check of the integrity of the external grounding system. The site annual electrical survey and repair does check the grounds. The adequacy of the external grounding system is not being ascertained prior to performing maintenance or operational checks.

- Corrosion Control Handbook D506-01182-09 Section 5, page 5, para. 5.2.51f, requires the wearing of a breathing apparatus if H_2S is detected, but does not stipulate the type of breathing apparatus. Safe working limits on the H_2S are not set or referenced, nor are other criteria such as use of the "buddy system", wind direction and velocity, communications, etc.

- Procedure 210P-1 IV.A.6., requires a check for hydrogen sulfide (H_2S) with a gas detector. If more than 10 parts per million (ppm) is present, continue to vent and monitor until atmosphere is clear. The procedure states "then proceed to step 8"; however, skipping step 7 could result in a spill as well as over-exposure to H_2S.

- Procedure 210P-1 IV.A.6. does not mention an ASME lock and bleed valve on pig trap/ launcher hinged closure. This is a safety device.

- Procedure D506-01458-09, Section 6, page 16, para 6.4.1c, requires the use of rubber gloves covered with protector gloves and for a person to stand on rubber matting or a dry board. Board thickness is not specified.

- Procedure D506-01458-09, Section 6, page 16, para 6.4.1a, states: "Never work on a 440V or higher voltage circuit that is hot unless it is not feasible to de-energize the circuit." Limits and alternatives to feasible de-energizing are not specified.

o A majority of the high voltage electrical motor control and circuit breaker centers and transformer boxes at Big Hill were not locked. Non-electrical trained personnel had keys to other electrical closures which were locked. For instance, operations and site security personnel had keys to the main 138,000 volt substation.

* The BPS/NOLA Electrical Safety Procedures and Practice Manual inadequately addresses precautions to be taken for high voltage, low voltage, etc. Examples are as follows:

  - Section 6, page 15, para. 6.3.9, states the same personnel requirements for higher voltage as page 26, para. 6.4.23, states for low voltage.

- Protective shields, protective barriers, or insulating materials shall be used to protect employees from shock, burns, or other electrically induced injuries when they are working in the proximity of exposed energized parts which might be accidentally contacted or where dangerous electric heating or arcing is likely to occur. Proximity limits are not explained or specified.

- The procedures address only exposed energized parts. No precautions are set, for example, for malfunctions or insulation breakdown (leakage). These failures could energize external surfaces of switchgear panels, etc. Barriers are not normally used.

- Acceptable insulation barriers and/or distances from potential sources are not set by the different levels of voltage used at the facility.

* BPS/NOLA Procedure 220P-1 V.F.2 and Environmental, Safety and Health (ESH), page 16, item C2, states that all power sources of 500 volts or greater in the vicinity of an excavation remain de-energized. Lower voltages are also hazardous but are not addressed.

* In the BPS/NOLA Employee Safety Handbook, page 14, item 23, methane gas must be bled off at the cavern well heads. Methane gas is extremely flammable; therefore, all ignition sources including vehicles should be kept at a safe distance. H_2S was not discussed. Neither distance nor safe location criteria were defined.

* The BPS/NOLA Employee Safety Handbook, page 8, item 14.b.2, states: "When entry is necessary, one man must be stationed outside the entrance of any vessel in which men are working and remain at the post". The word vessel does not include other confined spaces that may present similar hazards for example, cavern well sumps.

* Written procedures lack adequate safety cautions and instructions.

CONCERN: See MC.1-3.

F.7 MAINTENANCE HISTORY - MA.7

PERFORMANCE OBJECTIVE: Maintenance history should be used to support maintenance activities and optimize equipment performance.

FINDINGS:

- o A complete maintenance history was available at the sites and at New Orleans through formally documented programs. Maintenance records were first computerized by New Orleans in 1982. Early records were limited but good historical data are available since 1984.

- o The drawdown Critical Items List (CIL) document no. D506-1430-09 was developed in New Orleans from the Reliability, Availability, and Maintainability (RAM) system. The CIL list is complemented by a drawdown spare parts list prepared through the Integrated Logistics System (ILS). These two sets of critical items and parts are supported at the site by check-off lists identifying support equipment essential to the performance of repairs and complete item replacement during the drawdown phase.

- o The Systems Engineering RAM program receives failure reports from the sites through ILS procedures. The primary function of RAM is to assure that the sites are capable of meeting the requirements for drawdown.

- o The initial CIL was prepared based on RAM analyses of these reports. The ILS is now refining the CIL based on RAM prepared Piece, Part, Failure Mode and Effect Analyses.

- o Request for change to the CIL can be initiated by anyone and is reviewed by the RAM assessment Review Board for acceptance or rejection.

- o Data are readily retrievable through ILS. In New Orleans ILS is preparing a cross-correlation with property nomenclature which will permit the data to be retrieved at any connected computer terminal.

CONCERN: None.

G. TECHNICAL SUPPORT

Safety requires technical verification. A failure in a verification or assurance function represents a failure in the safety program. Many assurance functions were observed to be procedure compliance based rather than emphasizing technical prevention and detection activities. All deficiencies identified in this section represent a compromise of safety at the SPR.

The functional areas reviewed for Technical Support include engineering, construction management, property controls, procurement, instrument maintenance, site laboratories, and quality assurance.

Activities for facility modifications were found to be appropriate with support systems in place for tracking and controlling projects. Design reviews and construction inspections are being performed by BPS for those projects for which they are responsible. BPS inspection activities are restricted on certain types of site projects performed by other DOE contractors. BPS does not have direct control of site drawings for revision, update and status tracking; this is the responsibility of the DOE Architect/Engineer. BPS drawing management systems do not adequately assure that site organizations are provided with correct drawings.

Efforts are being made to evaluate in-house performance experience and disseminate the information but these activities are primarily directed toward hardware reliability performance rather than safety issues or program concerns. The use of lessons learned from outside the Department of Energy is lacking. UOR procedures do not meet DOE 5000.3 requirements. The reporting of near miss incidents and other useful management information is not occurring.

Site laboratory activities, primarily directed toward environmental compliance but also including oil quality analysis, were found to be acceptable in most areas. The control of special processes for nondestructive testing and welding operations are consistent with requirements. Instrument calibration programs are consistent with requirements and good practices with one exception; field observations indicated some inconsistencies in identification and calibration status markings.

Procurement, receiving inspection (at the clerical and quality control levels), and supplier control activities are appropriate in most areas. Problems relating to procedure compliance and the appropriate use of technical expertise have been identified with certain types of procurements. The identification and control of hardware and materials are adequate with the exception of an isolated deficiency in the control and storage of welding rods.

Several systems and activities are in place to control nonconforming equipment and material; however, the formal nonconformance control system (as defined in the BPS Quality Assurance Manual) has a minimum role in the control of nonconforming hardware. In practice, the formal nonconformance control system primarily focuses on people related issues (such as procedural violations and noncompliances) rather than faulty hardware.

Inspection functions and programs are in place, but in spite of these inspection activities and other efforts being made to evaluate hardware problems, many hardware deficiencies are neither consistently identified by these activities nor are they corrected when identified.

G.1 FACILITY MODIFICATIONS TS.1

PERFORMANCE OBJECTIVE: Technical support services required by the facility to execute modifications should be carried out in accordance with sound engineering principles.

FINDINGS:

- o SPR facility modifications require BPS interact with various organizations including DOE engineering and construction contractors and BPS subcontractors.

- o BPS roles, depending on the project, include design review, construction management, construction (small jobs only), turn-over inspections and performance acceptance testing.

- o All SPR design engineering activities are governed by the DOE/NOLA Level III Design Criteria document. Major modification designs are performed by Walk, Haydel and Associates (WH&A), DOE's principle architect/engineer (A/E) contractor at SPR, and other DOE engineering contractors. A formal BPS, WH&A interface Working Agreement document has been accepted by both BPS and WH&A and approved by DOE/NOLA.

- o Site and New Orleans personnel participate in the design review processes for DOE and BPS projects at various stages of design and completion via the 30%/75%/100% review process as defined in the Level III Design Criteria. Review of records at New Orleans indicated appropriate design review and construction inspection for those onsite projects for which BPS has contractual responsibility. BPS also conducts performance acceptance testing.

- o BPS does not have inspection roles on some types of projects being performed onsite by the DOE contractors. BPS accepts work performed on these projects based on quality assurance and inspections performed by other DOE contractors.

- o Major modifications at West Hackberry are performed by DOE contractors under the cognizance of BPS site Construction Management.

- * At Big Hill, major projects are being performed by DOE contractors that are not subject to BPS oversight. The BPS construction management role is limited at Big Hill.

- o Facility modification projects under BPS control are tracked through site configuration management coordinators. Project tracking systems were found to be adequate.

- o Site modification subcontract and work order packages reviewed at Big Hill indicate appropriate surveillances, reviews, and verification activities by various BPS functions.

- o The "Request for Information" system is used by BPS site Construction Management to direct questions to the A/E when they (BPS Construction Management) note apparent discrepancies or concerns relating to design.

- o The field change system was found to be controlled with appropriate engineering review and disposition of construction initiated changes.

- * Review of current BPS Construction Management projects at the sites visited indicated these projects to be well documented except for the control of redline drawings.

- * At present, site drawings are controlled by the DOE A/E. BPS New Orleans is aware of the benefits of a centrally controlled (at New Orleans by BPS) drawing system and has submitted a proposal to DOE to establish control of the site drawings.

- * Site drawings are maintained officially only in the site libraries; there is no routine distribution of drawings to the various site organizations. These site organizations must request their own updated drawings as they have the need. There are means for duplicating drawings onsite at West Hackberry but not at Big Hill. Drawing revision notifications are sent to site organizations by New Orleans.

- * The use of drawings at West Hackberry is complicated by the practice of maintaining several versions (revisions) of the same drawing in the site libraries to reflect various projects in progress that apply to a particular system. The current system for identifying the various revisions and selecting the most current version of a particular drawing is confusing.

- * The West Hackberry drawing control and distribution practices are driven primarily by the drawing systems used by the DOE A/E. These drawing control practices do not adequately assure that site operations and maintenance organizations are provided with correct drawings. Drawing control practices at all SPR sites, except Big Hill, are reportedly the same as those observed at West Hackberry.

- o Big Hill has implemented a system for indexing drawings and tracking drawing status (including redline, as-built, and Engineering Change Proposal (ECP) status). The system includes

a computer data base drawing index which is updated for status change. The controlled drawing sets maintained in the site library at Big Hill were found to be well organized.

* Little effort has been made by BPS New Orleans to evaluate and apply the good drawing practices used at Big Hill to other sites.

* There are between 100 and 200 drawings at Big Hill with unknown as-built status as indicated in the site drawing status tracking system. These drawings are associated with disputes with various contractors that are presently in litigation.

* Interviews at New Orleans indicated that the Big Hill as-built drawing situation is not being tracked in the New Orleans management tracking system.

* When reviewing a construction project at West Hackberry, it was found that the subcontractor's redline drawings were not current. As a result of this appraisal, Construction Management issued a Notification of Noncompliance (NON) against the subcontractor. Interviews in New Orleans indicated that site construction subcontractor redline drawings are frequently found to be not current.

CONCERN: See MC.7-1.

G.2 EVALUATION OF OPERATING EXPERIENCE TS.2

PERFORMANCE OBJECTIVE: Industry and in-house operating experiences should be evaluated by technical support analysts and appropriate actions taken to improve facility safety and reliability.

FINDINGS:

- o BPS has implemented a Failure Reporting Analysis and Corrective Action System (FRACAS) (BPS D50601224-09) which captures data (primarily relating to equipment failures) from numerous sources, establishes a data base, and systematically analyzes these data. Reports are provided to initiate improvements and avoid potential problems.

- * The Crosstalk Information Exchange Program, per SPRPMO 5910.1 and BPS 220P-2, provides a vehicle for exchanging lessons learned from experience at all SPR sites. The program is voluntary and is intended to communicate items of general interest. It is not frequently used.

- o The weekly site conference call with NOLA provides a forum for airing and exchanging problems and concerns.

- o The Hazard Abatement Tracking System (HATS) (BPS D506-01098-09 Users Guide) is designed and used to systematically identify, track, and follow up safety hazards and to update SARS.

- * Responsibility for corrective action is assigned to the site. If the action requires an ECP or Capital Improvement Project (CIP) for implementation (usually a high dollar value) the responsibility is shifted to New Orleans management and even to DOE for final approval. The resolution of open items lacks timeliness as evidenced by a number of long standing open entries. (see also Section MC.7).

- o An Action Item Tracking System (in addition to HATS) is documented in 1OP-2 "Management Emphasis System". At the sites, it is used to document action items from the Monthly Site Project Reviews. The system is controlled principally through New Orleans to capture management actions.

- * The Fire Protection Audit Tracking System (FPTS) also contains some long-standing open items (see also Section FP.4).

- * Analysis and trending is formally assigned to Systems Engineering in New Orleans. Only limited, ad hoc trending and tracking of safety issues occurs on site.

CONCERN: See MC.7-2.

FINDINGS:

- o Distribution of lessons learned from experience is made to the sites through the Operations and Maintenance Directorate in New Orleans to the site manager and through the Construction Management Directorate in New Orleans to the site construction supervisor. Some lessons learned from other SPR sites, some limited UORs, and other safety related data are distributed directly to the support staff through NOLA support directorates on an ad hoc basis.

- * There is little evidence of lessons learned from related industry experience being included in safety information distributions. The exception is an occasional article from a trade publication.

- * Accident Investigation procedure (120P-17) requires distribution of reports only to DOE. No program exists to share the information among employees.

CONCERN: (TS.2-1) (H2/C2)

There is no effective program to distribute lessons learned from related industry experience nor to disseminate non-hardware lessons learned at all the sites.

FINDINGS:

- * The BPS Unusual Occurrence Reporting (UOR) procedure (220P-16) requires verbal notification be given to the Operations and Maintenance Control Center at New Orleans. The UOR coordinator at NOLA verbally notifies the cognizant SPRPMO assistant Project Manager (APM) to determine if a UOR should be written. The site UOR coordinator normally writes the UOR, if one is required, in lieu of the cognizant operations or maintenance supervisor. A BPS number is assigned temporarily until an approved number by DOE, if any, is available. Two UORS were written in 1988 by Big Hill, and four were prepared for all SPR. None of these have been finalized and sent to DOE Headquarters.

- * No procedure requires the reporting of near-miss events nor the retention of safety deficiencies that are resolved in less than thirty days. (See MC.1.)

- * The BPS UOR Procedure is not in compliance with DOE 5000.3; however, it is consistent with both SPRPMO 5000.3 and OR 5000.3 on UORs. The DOE order requires that systems be implemented so that the contractor determines those events that should be written and reported as UORs.

CONCERN:

See MC.5-5.

G.3 PROCUREMENT TS.3

PERFORMANCE OBJECTIVE: Provisions are established for the control of purchased material, equipment, and services; for selection of suppliers; and for assessing the adequacy of procurement activities.

FINDINGS:

- o BPS procurement activities are principally controlled and handled through the New Orleans offices. Less critical procurements are handled at the sites.

- o Site-initiated procurements are restricted to specific dollar limits. Larger procurements must be handled by the BPS New Orleans office. There are also technical criteria in addition to cost, that determine when procurements must be accomplished through the New Orleans office.

- o Purchase requests are routed for review and sign-off by the various specialty support groups (i.e,, Safety, Environmental, Fire Protection, and Quality Assurance). In addition to their own review, Quality Assurance is also responsible for assuring review by the other groups.

- o The selection of pre-qualified and certified suppliers for certain types of services (such as nondestructive testing and instrument calibration) is performed by the BPS New Orleans offices. The New Orleans office provides site procurement personnel with up-to-date lists of approved vendors for these services (these lists were reviewed during this appraisal). Vendors source inspections and surveillances are performed by New Orleans BPS Quality Assurance source inspectors with occasional use of site QA inspectors when needed.

- o Procurement records and documentation were found to be in order. Appropriate controls were in place for maintaining and tracking documents. Procurement contract documents reviewed contain standard safety and quality requirement clauses.

- o A computerized tracking system administered by New Orleans is used to assure that required inventory levels of draw-down "critical" related spares is maintained at the west Hackberry site. Two reports are sent to site property personnel on a weekly basis; one report lists the critical spares inventory and the second is a deficiency report which indicates critical spares levels that are "less than authorized". New Orleans initiates purchase requests for these "less than authorized" critical spares. Site procurement validates these reports. Drawdown critical spares inventory is not being maintained at Big Hill since this site is not yet in a drawdown capable

status. Interviews at New Orleans indicated that the situation at West Hackberry is typical of sites in a drawdown operational status.

- o At West Hackberry, it was found that a 100 percent spares physical inventory check is performed onsite annually.

- o New Orleans BPS-initiated procurements are not routinely routed through the sites for final review prior to issuing the contracts; however, the sites have input through various informal communication processes.

- * Interviews with various BPS personnel indicated confusion and misunderstanding of the requirements and procedures relating to material acquisition through the Government Services Administration (GSA).

- * Recently, the New Orleans Procurement organization has formally addressed problems experienced with acquisitions from GSA. It was determined by New Orleans Procurement that many of these problems were caused by BPS personnel not following existing BPS Procurement policies and procedures. New orleans Procurement has issued an internal BPS memo (dated September 29, 1988) clarifying BPS policy regarding acquisitions from GSA sources and emphasizing the need to follow procurement procedures.

- * Big Hill site personnel are aware of concerns associated with acquisition of equipment and material from GSA. Past experiences have resulted in GSA not providing necessary documentation (such as calibration certifications and Material Safety Data Sheets) with equipment and material provided to the site. A decision was made at Big Hill to not use GSA when acquiring items requiring critical documentation. New Orleans Procurement verified that GSA does not always provide required documentation or meet other technical requirements.

- * A case was identified during the Big Hill review where GSA equipment was recently received onsite with technical deficiencies unknown to the site. It was determined by the appraisal team that a GSA furnished vacuum truck does not meet technical safety design, documentation, and certification criteria required by Federal regulations, nor the requirements specified by the BPS New Orleans office where the acquisition was initiated. Receiving inspection was performed onsite to the extent permitted by the limited documentation received with the truck on delivery. BPS site verification activities did not assure that the truck met all technical requirements.

In this case, the site accepted the limited GSA documentation which simply stated that the truck is in compliance with all regulations and technical requirements.

CONCERN: See MC.1-2.

G.4 ANALYTICAL LABORATORY TS.4

PERFORMANCE OBJECTIVE: Analytical laboratories are organized to provide technical support measurements, analyses, calculations and data to facility organizations requiring this service. They are staffed with trained, experienced, and qualified persons and operate in accordance with documented procedures. Their operation shall support the facility in a timely and effective manner.

FINDINGS:

- o BPS onsite laboratory activities are primarily directed toward environmental compliance analyses. Laboratory activities at west Hackberry also include crude oil quality analyses. Onsite crude oil quality analyses are not performed at Big Hill.
- o At both sites these activities are performed by a three person team located on site consisting of a professional environmental specialist, a chemist, and a laboratory technician. The onsite environmental laboratory staff report directly to the BPS Environmental Control organization in New Orleans and have an indirect reporting channel to the site.
- o Interviews at New Orleans indicated that similar arrangements exist at the other SPR sites.
- o The required laboratory functions are documented in the Environmental Control Operating Procedures (130P-4 and 130P-5), the Environmental Program and Procedures Manual (D506-01011-09), and the Environmental Permits Manual (D506-01188-09).
- o The above manuals identify standards and methodologies (primarily from industry and government agencies -e.g., EPA) to be used by laboratory personnel for their analysis procedures.
- o The laboratory analysis work by the chemists and technicians was found to be documented in laboratory note books.
- o Adequate performance of the onsite environmental laboratories is periodically evaluated by BPS, EPA, DOE/NOLA, and state agency audits and spiked blind sample analysis tests.
- o Laboratory personnel are knowledgeable of laboratory and analysis procedures and practices.
- o Laboratory records and documents were found to be auditable.

- o It was determined that site laboratory personnel have total control (within budget limitations) over how their laboratory is equipped as well as the maintenance and calibration of their equipment with the exception of certain major equipment items that New Orleans provides to the laboratories.

- o The access to the laboratories was found to be appropriately controlled.

- o The laboratory calibration programs appear to be adequate. Calibrations and certifications are well documented and records are appropriately maintained. Calibrations and certifications were found to be consistently traceable to the National Bureau of Standards (NBS).

- o At the Big Hill environmental laboratory the Material Safety Data Sheets (MSDS) were found to be readily accessible and well controlled. The West Hackberry laboratory Material Safety Data Sheets were not well organized or readily retrievable. The laboratory personnel agreed with the finding and initiated actions to correct this deficiency during the site appraisal. New Orleans became aware of this immediately following the site appraisal and is also participating in the resolution of this finding. (Findings addressing the overall site-wide status of MSDS control and availability are included in Section I.H.6, along with a reference to Concern IH.2-1.)

- o Laboratory analysis samples were found to be generally well documented and tracked. Samples analyzed on site are logged in and traceable throughout the analysis process. One discrepancy was noted at West Hackberry, however. It was found that analysis samples and other laboratory materials shipped off site are not properly packaged or labelled as hazardous materials. (This finding is included in Section ST.6 that also references generic concern MC.5-5.)

- o At West Hackberry, the laboratory facility was found to be neat, clean, and orderly and appropriate care was observed when witnessing analysis procedures.

- o At Big Hill, the laboratory was observed to be in a functional, though some what cluttered and congested, condition. It appeared to be more of an inadequate space problem rather than lack of care.

CONCERN: None.

G.5 RECEIVING INSPECTION TS.5

PERFORMANCE OBJECTIVE: Provisions are established for the inspection of purchased material, equipment, and services in accordance with documented procedures by trained personnel.

Provisions are established to assure that documented evidence of the conformance of material and equipment to procurement requirements is available at the plant site prior to installation or use.

FINDINGS:

- o Site receiving inspection activities are covered by the Supply Services Manual D506-01061-09.
- o Site receiving inspection activities are typically limited to a clerical function. Special technical verification is not performed unless specifically defined in advance as a receiving requirement in the procurement documents. This detailed technical review of received material is not a part of most BPS site receiving activities. See Section TS.3.
- o Functionally dedicated and well controlled areas are provided in the site warehouses for receiving activities.
- o Receiving inspection documentation and records were found to be orderly and well controlled.
- o The site receiving clerks are provided with copies of all open procurement contracts, which are used as quantity verification check lists when items are received.
- o All received items waiting inspection are placed in special areas dedicated to this function.
- o Quality Assurance inspectors inspect received items when requested by receiving clerks and when required by procedure for certain categories of hardware as identified in the Supply Services Manual. At West Hackberry, it was observed that site Quality Assurance performs receiving inspection on all drawdown "critical" spares.
- o The Report of Discrepancy (ROD) system administered by site Property Control is the principle system used for tracking and disposition of received items determined to be discrepant. Use of the site Quality Assurance processes such as the Quality Inspection Report (QIR), Nonconformance Report (NCR), and Material Review Board in these disposition actions is very limited.
- o ROD items are tagged and stored in controlled areas to prevent use and are tracked in on-site logs until dispostioned. The

most typical disposition of RODs is the return of the discrepant material to the supplier; however, occasionally ROD items are accepted for use following review by site personnel for suitability for the intended use.

CONCERN: None.

G.6 CALIBRATION PROGRAM TS.6

PERFORMANCE OBJECTIVE: Provisions are made to assure that tools, gauges, instruments, and other measuring and testing devices are properly identified, controlled, calibrated, and adjusted at specified intervals.

FINDINGS:

- Documented programs are in place for maintaining and calibrating measuring and test equipment (MTE) (Operating Procedure 220P32 -Measurement and Test Equipment Calibration Systems) and installed process instrumentation (Integrated Logistics Support Manual D506-01702-09).

- At present three separate calibration programs are maintained:

  (1) Installed process instrumentation.

  (2) MTE used by Instrumentation and Control (I&C) Maintenance.

  (3) Environmental laboratory instrumentation and measuring equipment (see Section TS.4).

- A new BPS procedure (Calibration Master Plan, D506-01767-09) is currently being prepared to consolidate the calibration of the installed process instrumentation and MTE into a single calibration program led by BPS New Orleans. The final review draft of this procedure was examined.

- At present, many aspects of the site calibration activities are handled differently from site to site. The implementation of the new BPS procedure will essentially eliminate these differences between the sites.

- The site Instrumentation and Control (I&C) Maintenance organizations are responsible for maintaining the calibration of the installed process instrumentation and the MTE used by I&C Maintenance as onsite calibration standards.

- Calibration status and due dates are tracked in a computerized master Preventive Maintenance (PM) tracking system maintained by the BPS Integrated Logistic Support group in New Orleans. Monthly reports are provided to the site I&C Maintenance supervisor identifying calibrations that are due. A separate monthly delinquency report is also provided to site maintenance from New Orleans.

- All delinquent calibrations are reviewed on a monthly basis by site Maintenance as required by procedure. This monthly review includes the submittal of a written explanation to the Site Manager explaining each delinquency.

- The instrument calibration status was reviewed for the two sites visited. These delinquencies were found to be adequately tracked. Most of the delinquencies were for MTE with calibration delays being attributed to the processing of vendor service contracts.

- Standardized preprinted procedures, known as Maintenance Requirement Cards (MRCs), are used by the maintenance technicians in performing onsite calibrations.

- Work orders for the PM calibration activities are provided to I&C Maintenance by the site Project Planning and Control organizations based on the monthly PM tracking reports provided from New Orleans. Three months advance notice is provided to the sites for MTE calibration due dates.

- Review of the process at West Hackberry indicated that calibration data sheets are completed by the technician for all onsite calibrations. The information on these data sheets is entered into the computerized master PM history data base maintained at New Orleans. The data sheets include "as found" as well as "as left" conditions.

- Site Quality Assurance verifies calibration activities (as performed by the maintenance technicians) through the site QA preventive and corrective maintenance surveillance programs. Site Quality Assurance performs formal semiannual system evaluations on site calibration activities. Random facility walkthrough inspections are used by Quality Assurance to inspect calibration stickers. Zone inspections performed by site maintenance organizations also identify calibration sticker deficiencies.

- Installed process instruments are typically tracked by location rather than by serial numbers. Specific device tracking is less likely to result in improper equipment calibration.

- At West Hackberry, all pressure gauges are replaced on a 6-month basis with recalibrated pressure gauges. Pressure gauges are tracked by serial number.

- MTE is tracked by unique component identification numbers.

- Calibration records were found to be well maintained. Appropriate documentation was seen showing traceability to the National Bureau of Standards (NBS).

- Site MTE is calibrated by qualified vendors preapproved by New Orleans BPS procurement.

- o MTE was observed to be controlled with appropriate tracking logs for checked out equipment.

- * At West Hackberry, up-to-date calibration stickers and component identification numbers were seen on the MTE examined. Calibration stickers are not consistently used on MTE at Big Hill. Discrepant MTE taken out of service is appropriately controlled by labelling and segregation. Redundant onsite systems are used as back-up for MTE calibration tracking, in addition to the New Orleans ILS PM tracking system.

- * At West Hackberry, field observations of installed instruments indicated inconsistent identification labeling of equipment. Calibration stickers were, for the most part, in place and up to date. In a few cases, calibration stickers were missing. In several cases, the information on the stickers was difficult to read.

- * The calibration program at West Hackberry includes a confusing system of dual calibration stickers on pressure gauges. One sticker reflects the date of the last calibration and a "due date" for recalibration based on calendar time. The second sticker reflects the actual installation date and a different recalibration "due date" based on the installation date. The existing procedures require the use of both stickers. The calibration "due date" on the second sticker is the one used for calibration tracking.

- * At Big Hill, legible and up-to-date calibration stickers were seen on installed process instrumentation. One discrepancy noted, however, was the use of more than one type of calibration sticker (with differing information) on installed pressure gauges. Discussions with Big Hill Maintenance personnel indicated that changes are being made in the calibration program that will correct this discrepancy.

- * BPS was already aware of problems concerning the tagging and labelling of instruments and MTE for calibration status at the sites. The implementation of the planned new calibration program procedures will correct many of these marking discrepancies.

CONCERN: (TS.6-1) (H3/C2)

The component identification and calibration status is not consistently indicated on installed process instrumentation and measuring and test equipment.

G.7.a CONTROL OF NONCONFORMING HARDWARE TS 7.a

PERFORMANCE OBJECTIVE: Provisions are established to control the use or disposition of nonconforming hardware, materials, parts, or components.

FINDINGS:

- The control of nonconforming materials and hardware was found to be adequately implemented relative to receiving inspection and warehouse areas (see sections TS.5 and TS.7e).
- Procedures are in place (Supply Services Manual D506-01061-09) for the return of defective and damaged material from Operations and Maintenance to Property Control for segregated storage and disposition. Evidence of appropriate practice was seen at Big Hill.
- The control of nonconforming hardware is accomplished by the collection of several systems and programs throughout BPS. The formal Quality Inspection Report (QIR) and Nonconformance Report (NCR) processes (as described in section QAD15, Nonconformance Control, of the BPS Quality Assurance Manual D506-01038-09) have a limited role in this process.
- The emphasis of the QIR and NCR systems is on procedural noncompliances, but these systems do also address certain types of hardware discrepancies.
- QIRs and NCRs are, by design, not used for hardware discrepancies covered by other administrative systems, including any hardware or equipment problems entered directly into the work order system by maintenance or operations personnel.
- The principal means for obtaining equipment failure data is by direct extraction from work orders and entry into the Failure Reporting Analysis and Corrective Action System. (See Section TS.2.) This is a centralized function at New Orleans.
- Material Review Boards, which include Quality Assurance and Engineering representatives, are used for the disposition of material discrepancies that cannot be resolved by other means.

CONCERN: None.

G.7.b INSPECTIONS TS.7.b

PERFORMANCE OBJECTIVES: Activities affecting quality, including the items from activities performed, are inspected.

Organizational responsibilities and qualifications are established for individuals or groups performing inspections.

Prerequisites are provided in written inspection procedures with provisions for documenting and evaluating inspection results.

FINDINGS:

- o Observations and review of documentation during this appraisal indicate that Quality Assurance and other technical inspections are being performed onsite.
- o Various project packages reviewed indicated the use of hold points and witness notification requirements for work being performed on site.
- o Site QA has an active preventive maintenance (PM) and corrective maintenance (CM) surveillance program by which randomly selected PM activities and certain CM activities are reviewed using quality assurance checklists. Many of the CMs also have mandatory QA hold points.
- o Receiving inspections for certain categories of received items are performed by QA as required by procedures (see section TS.5).
- o The West Hackberry site appraisal included observations of site QA independent verification of check-out steps for the installation-of the site Distributed Control System (DCS).
- o The results of QA inspections are documented and retained.
- o Although limited in their use, QIRs and NCRs are used to document certain types of concerns and nonconformances. The closure of QIRs and NCRs requires formal review and disposition. Closed out QIRs and NCRs are entered into the New Orleans BPS Non-Compliance Tracking System (see also Section TS.7.a).
- o QA inspectors were found to be qualified and certified for welding inspection and nondestructive testing (see section TS.7.c).
- o Formal and informal zone inspections are performed by site operations and maintenance personnel. At Big Hill, it was determined that site QA tracks disposition of discrepancies

resulting from the formal zone inspections. The formal zone inspections at Big Hill are scheduled to cover the entire site four times a year.

* Evidence was seen at New Orleans and the sites visited of detailed technical inspections being performed by BPS Quality Assurance and Construction Management personnel throughout the life of onsite construction and modification projects where BPS has oversite responsibility. BPS is not contractually involved with the in-progress inspection activities for certain types of onsite projects being performed by other DOE contractors.

* Inspections are being performed by various BPS organizations through many processes, but important deficiencies are missed or not corrected when identified. Sections OS.5, FP.2, and MA.1 include listings of site equipment safety and fire protection deficiencies observed by the appraisal team. Some of these deficiency conditions were known by BPS prior to this appraisal and are being reviewed by BPS and other DOE contractors. The types of deficiencies noted in the referenced sections include:

  - Improper electrical installations in fire/explosion hazard classification areas.

  - Deteriorated lightning protection systems.

  - Inadequate electrical grounding of installed equipment.

  - Inadequate personnel protection controls in high voltage areas.

  - Damaged and unsafe electrical system installations (e.g., exposed wires).

  - Piping system component and configuration deficiencies (e.g., improper relief valve arrangements, missing bolts, cathodic protection component discrepancies).

  - Spark arrestor discrepancies.

  - Improper storage of flammable gases and liquids.

  - Safety deficiencies on work over rigs, cranes and lifting equipment, and vacuum trucks.

CONCERN: See MC.1-2.

G.7.c CONTROL OF SPECIAL PROCESSES TS.7.c

PERFORMANCE OBJECTIVE: Provisions are established to assure the acceptability of special processes such as welding, heat treating, nondestructive testing, and chemical cleaning, and that special processes are performed by qualified procedures and equipment.

FINDINGS:

- The special processes controlled by BPS at the sites are limited to welding and nondestructive testing (NDT).
- Organizational responsibilities for the control of special processes are defined in the Quality Assurance (QA) Manual D506-01038-09, QAD 9, and D506-01118-09 "Written Practice for Qualification and Certification of NDT Personnel."
- Criteria for determining the special processes to be controlled are found in QAD 9.
- QAI 9.1, Control of NDT Agencies, and QAI 9.2, Certification of Welding Inspectors, are procedures that require qualifications and certifications in accordance with American Welding Society (AWS) and American Society for Non-Destructive Testing (ASNT) standards. American Petroleum Institute (API) and American Society of Mechanical Engineers (ASME) welding procedures are also used onsite.
- The New Orleans Quality Assurance staff includes a welding specialist that is certified by AWS as a welding inspector and by ANST as the BPS Level III NDT inspector for all categories of NDT performed by BPS.
- Appropriately certified welding and NDT inspectors are provided at the sites.
- The QA organization monitors site and subcontractor special process activities and maintains applicable records.
- All welding and NDT procedures used at the sites are reviewed by the New Orleans welding specialist.
- Previously cited procedures and documents specify the records and methods required for evidence at the sites, including welder and weld process qualifications and inspector certifications.
- Inspector certification records are kept both onsite and at New Orleans. Examination results are kept at New Orleans.

- Current files and records at the sites and at New Orleans were reviewed and found to be adequate and in compliance with BPS procedures.

CONCERN: None.

G.7.d SUPPLIER CONTROL TS.7.d

PERFORMANCE OBJECTIVE: Provisions are established for the control and selection of suppliers and for assessing supplier adequacy and quality.

FINDINGS:

- o Supplier control procedures are documented in the Procurement Procedures Manual D506-01086-09.
- o Formal supplier control activities for large procurements and for procurements where supplier capability and qualification are considered critical are primarily handled by the New Orleans office.
- o Approved lists of qualified vendors are provided by New Orleans to the sites for certain types of services such as calibrations and non-destructive testing (see Section TS.3).
- o The control and selection of suppliers for the smaller procurements allowed to be processed by site buyers is governed by Government procurement regulations and the Procurement Procedures Manual.
- o Originators of purchase requests participate in the selection of suppliers by recommending preferred suppliers, when appropriate, based on the requestor's experience and knowledge of the supplier's capabilities. The buyers make the final selection considering these recommendations.
- o Surveys are conducted at vendor locations to qualify vendors for specific types of procurements. These surveys include participation by BPS Procurement personnel (buyers) as well as appropriate BPS functional and support organizations including Quality Assurance.
- o New Orleans Quality Assurance actively participates in vendor qualification activities, with particular emphasis on assuring that appropriate quality assurance plans and programs are in place at the vendor shops. A standard Subcontractor Quality Control Requirements document has been developed that defines a comprehensive program. BPS subcontractors are required to meet these requirements. The BPS subcontractor Quality Control Requirements include the assignment of responsibility (within the subcontractors organization) for inprocess testing, inspection, and final product acceptance as well as provisions for BPS witnessing these activities.
- o The New Orleans Procurement organization has implemented a Supplier Performance Evaluation and Rating (SPEAR) program that provides a means for collecting evaluation feed back from various BPS organizations relative to the past performance of

a vendor. The information is used by New Orleans Procurement to assist in vendor selection for future procurements.

- o An analysis of receiving inspection Report of Discrepancy (ROD) actions at the sites was recently conducted by New Orleans to help identify performance trends of vendors.

- o Sole source procurements are controlled by the Procurement Procedures Manual.

CONCERN: None.

G.7.e IDENTIFICATION AND CONTROL OF HARDWARE/MAT. TS.7.e

PERFORMANCE OBJECTIVE: Provisions are established to identify and control hardware, materials, parts, and components as well as to assure that incorrect/defective items are not used.

FINDINGS:

- o Review of the site Property Management warehouses and the Property Control function at New Orleans indicates that, with some exceptions, adequate practices are in place for identification and control of hardware and materials. Property Control procedures are documented in the Supply Service Manual (D506-01061-09).
- o Evidence was seen of reviews and surveillances of site property control activities periodically performed by New Orleans.
- o A review of site warehouse and storage areas indicated appropriate storage practices. Items are stored in bins and shelf locations with appropriate labels. Large items are stored in controlled storage yards with an effective system for tracking by location.
- o Site warehouse inventories are centrally documented and tracked through New Orleans Integrated Logistics Support computer systems.
- o Appropriate measures were observed for the preservation of stored items.
- o Material control systems were reviewed in the Big Hill maintenance shop. Materials and tools are kept in a locked area. Stored materials are segregated and identified through the use of labels and marked storage bins. Check-out logs are used to track issued equipment.
- o Appropriately labeled metal cabinets for the storage of flammable materials were observed at the Big Hill maintenance shops.
- o There are adequate controls of deficient and defective items in the storage areas.
- o At West Hackberry, it was observed that drawdown "critical" items are identified through a special tagging systems while in storage.
- o Improper storage of welding rods was seen in the site maintenance shops (see Section MA.4 and Concern MC.5-1).

CONCERN: None.

H. MANAGEMENT CONTROL

The Management and Controls section identifies a number of concerns which cut across other sections of the report. Support for these concerns is identified in this section and detailed elsewhere in this report as indicated in references. Consequently, this section of the report can be regarded as summarizing and collating related concerns from the appraisal.

At the Strategic Petroleum Reserve, line management is assigned responsibility for safety of operations and maintenance and other directly related functions. Independent safety and quality assurance overviews are provided by Office of Technical Assurance personnel assigned to the sites. Organizational interfaces, responsibilities and authorities are defined in top and intermediate level plans. These are well understood by site personnel. A programmatic line safety overview is provided by the Site Safety Council. In practice, the council functions as an advisory body to the Site Manager who is its chairman.

Four concerns related to site organization and administration are expressed. First, the achievement of safety and health goals is hindered by the inadequate exercise by NOLA of their site safety responsibilities. In addition, deficiencies in expertise, training, and use of personnel resources for technical assurance and procedure development, the use of safety deficient procedures and the lack of the site manager's full authority over safety matters lead to additional concerns.

Audit activities are conducted at appropriate organizational levels up to and including Boeing Company, Seattle. A combined audit, aimed at improving audit effectiveness, has been developed, but not yet applied to the sites appraised by the team. The audit process is generally of insufficient depth to uncover latent safety problems and basic causes of deficiencies. In addition, significant safety data associated with "near misses" and human performance are not captured and analyzed.

Safety improvements are addressed in the planning process. Although site safety goals are developed by the Site Safety Council for the site manager, these goals are routine and insufficiently challenging.

Corporate support for safety is expressed in the Project Management Plan and lower tier documents. Safety policy and project level safety goals are not addressed aggressively by BPS. Although Boeing Company, the owner of BPS, provides safety support in the form of general policies, technical assistance, and audits, the adequacy of the audits was found to be deficient.

In the management assessment area, the appraisal team found numerous material and equipment deficiencies, and noncompliances with regulations and DOE orders. In addition, the BPS surveillance activity was found to be addressing only rudimentary safety hazards and did not sufficiently address root causes and basic causes of generic deficiencies.

Personnel planning and management activities with regard to position descriptions, training, management development, and personnel performance appraisal, and the availability of expertise to assure clarity and accuracy of procedures were reviewed and deficiencies were identified. Safety duties are not clearly documented, leading to a decreased sense of employee safety accountability. Also, no mechanism exists to assure that appropriate training is accomplished. The personnel management system is not being utilized to encourage improved safety performance.

The documentation control plan is formally established and provides a basis for managing the development, amendment, issuance, and retrieval of controlled documents. Some specific deficiencies in implementation of document control and the Quality Assurance overview of the activity are noted. Guidance documents were found to be insufficiently available, not in useable formats, and poorly consolidated for use.

The Safety Analysis Report (SAR) at West Hackberry, originally issued in 1981 and updated in 1985, is not current. Identified hazards and hazard status is kept current by HATS updates. A particular concern is that the SARs are not being used or regarded as useful tools by operations and maintenance personnel. Also, a large number of specific hazards identified in the SAR, subsequently remain unresolved for an unacceptable length of time.

H.1 SITE ORGANIZATION AND ADMINISTRATION - MC.1

PERFORMANCE OBJECTIVE: Management should organize and administer the operation to provide for effective implementation of site activities relating to safety, health and quality assurance.

FINDINGS:

- o Sites are organized under a line management arrangement for Operations and Maintenance (O&M). Responsibility and authority passes directly to each site O&M organization through the site manager from the O&M Directorate in New Orleans.

- o Organizational responsibility for safety is assigned to line management. Each supervisor of Operations, Maintenance, Property, Site Support, and Construction Management serves or appoints a subordinate as safety supervisor, responsible for all safety activities in his organizational unit.

- * Safety supervisors appoint safety monitors to assist in the conduct of the safety program. The specific functions and responsibilities of safety monitors are described in the Safety Management Plan (D506-01002-09), but training requirements for safety monitors are not formally established. Safety concerns are identified and discussed in employee/supervisor safety meetings. Safety deficiencies that can be corrected immediately are not required to be reported to management. The reports, which are provided to the Site Safety Council (see below), vary widely in quality.

- * The team observed personnel working without adequate regard for safety hazards such as ignition sources in proximity to flammable/combustible hydrocarbons, use of improper respiratory protection, and working improperly near high voltage hazards.

- * Safety monitor training does not address identification of non-routine safety hazards, such as the examples cited above.

CONCERN: See MC.6-2.

FINDINGS:

- * Management surveillance and the administration of the line control safety program is not consistent from one site to another and from one functional area to another.

- * Certain policies and procedures vary substantially from site to site, with some more effective than others, e.g., noise policy, respiratory program, and hazardous materials vehicular transportation.

* With a few exceptions efforts of New Orleans staff to make effective programs and site specific procedures uniform across all sites are not in evidence.

* No mechanism is in place to assure that site-specific procedures are properly controlled. Program and procedure requirements vary from site to site in content and effectiveness, and no practice is in evidence to evaluate and standardize effective approaches SPR-wide.

* The management surveillance and line control safety system is not being administered consistently or effectively across all sites or by all departments within specific sites, and does not adequately identify safety and health hazards and program deficiencies.

o The event classification and reporting system (100P-4) establishes procedures for classifying and reporting unplanned events as Loggable or Reportable (to DOE).

* Procedures do not require reporting of "near-miss" events or retention of safety deficiencies which can be promptly resolved.

* The failure to capture information from the performance of emergency drills and exercises at all the sites and use it throughout the SPR suggests that New Orleans BPS management is not effective in meeting its responsibilities at the site level.

* The BPS management control system lacks clarity in the assignment of transportation safety responsibility, the means for clear communications, the delegation of authority for regulatory compliance actions and the need for awareness of transportation safety.

* There is no formal mechanism for sharing successful solutions to potentially project wide safety concerns among sites.

CONCERN: (MC.1-1) (H1/C1) Some cognizant NOLA organizational units are not adequately exercising their line control safety responsibilities for site activities.

FINDINGS:

o Safety functions and responsibilities of general employees, safety supervisors, supervision and management are defined in the safety management plan. Site personnel are held responsible for their own safety and the safety of others.

- o Independent safety overview is provided by a site safety administrator who reports functionally to the site manager and administratively to the Technical Assurance Directorate in New Orleans. Quality Assurance, Security, and Fire Safety are similarly represented on site.

- o In addition to safety overview provided by the site safety administrator, the Site Safety Council, comprised of representatives from Operations, Maintenance, Construction Management, and Technical Assurance (Quality Assurance, Safety, and Environment), Fire Protection, and Security meet monthly to review safety concerns and provide advice to the site manager who is chairman of the Council. This is a major part of the line safety program. A significant part of the Council's agenda is derived from safety monitors' reports.

- o Requirements for safety overviews by the safety administrator and the Site Safety Council are formally established and clearly understood throughout the organization.

- * The safety administrator performs frequent, safety inspections which are reported to the site manager through the Site Safety Council; however, he does not regularly participate in the zone inspection program, partly because of other required duties, such as technical assistance to the site, member and secretary of the Site Safety Council and local operating review committees.

- o At Big Hill, based on a review of his weekly activity reports, it was estimated that the site safety administrator spends 5 to 10 percent of his time on safety inspections. It is assumed that a corresponding amount of the site safety administrator's time is similarly used at West Hackberry.

- * The independent overview of safety is compromised by performance of direct line activities by the site safety and environmental representatives. The appraisal team observed a meeting of the Controlled Environment Committee (CEC) at Big Hill. The CEC ostensibly met to review a proposed SWP embodying safety provisions specified by Operations in accordance with SWP procedures. In actual practice, the safety provisions were developed by the CEC with strong participation by the environmental and safety administrators.

- * The efficacy of the pre-contract award process is diminished by the lack of recognition on the part of the QA staff of the need to include transportation safety items in the process. The QA staff have insufficient knowledge in this area.

- * Additional deficiencies related to the adequacy of technical overview are discussed in other sections of this report as

indicated by the parenthetical references. The following should be considered as examples:

- (TS.6) Component identification and calibration status is not consistently indicated on installed process instrumentation and measuring and test equipment.

- (TS.7a) Site Nonconformance Systems are not being used to control and document all types of nonconformances, especially those relating to hardware discrepancies and failures.

- (TS.7e) There are no controls in place to prevent use of improperly stored and consequently deficient welding rods.

* Several instances of deficiencies in clarity and accuracy of procedures have been noted by the appraisal team. These are attributed to the lack of application of sufficient technical safety skills to satisfactorily address the relevant issues. These are examples:

  - (MA-6) Technical expertise to assure that safety cautions are satisfactorily addressed in procedures is lacking.

  - (OP.2) The exceedingly large number of deficiencies in the proposed revised SWP procedure, 220P-1 dated November 8, 1988 and in the crude oil tank cleaning procedure 220P-44 dated June 1, 1987 indicate that adequate expertise has not been brought to bear on this effort.

* Although specially qualified and certified quality assurance personnel have been sought and employed, no formal requirements for such positions have been established.

* In summary, complex tasks which mandate the application of a high level of technical expertise are sometimes not adequately performed because sufficiently well qualified personnel are not always made available or appropriately used.

CONCERN: (MC.1-2) (H1/C2) Technical assurance overview is inadequately performed because of, for instance, lack of expertise, and inadequate training and personnel resources.

FINDINGS: o Systems engineering assessments of the overall plant design and performance, including systems interactions are performed

by Systems Engineering, NOLA. An onsite maintenance engineer facilitates Systems Engineering involvement.

o Administrative controls in the form of approved procedures, work orders and Safe Work Permits (SWP) are used to control work that has safety implications.

* Safety and health programs are broadly defined in the BPS Safety Management Plan. While Big Hill has a site-specific equivalent document, West Hackberry uses the BPS document, without adaptation to account for site specific factors. A site specific version has been considered but is not firmly planned.

o The health and safety program requirements are detailed in the operating procedures.

* At West Hackberry, occupational noise and hearing protection requirements are not well defined. (See Section IH.3). However, at Big Hill, hearing protection requirements are satisfactorily implemented.

* BPS shipping and transportation policies and procedures are not addressed at either site (See Section ST.3).

* Additional examples of deficiencies related to the adequacy of procedures are discussed in other sections of this report as indicated by the parenthetical references.

- (OS.3) There is no formal program to identify all safety- critical operations and prepare and periodically revise written safe operating procedures covering work activities at BPS.

- (OP.2) The procedures for the November 8, 1988 SWP and the June 1987 crude oil tank cleaning operation 220P-44 are confusing and inadequate which could lead to unsafe conditions.

- (MA.3) The safety aspects of some maintenance procedures are inadequate or are not being implemented.

- (MC.5) The Site Safety Management Council at West Hackberry has inadequate procedures to assure that closure has been achieved on safety issues which are addressed by the Council.

- (ST.3) Transportation and shipping activities are not in compliance because of incomplete references and lack of procedures.

- (IH.5) The procedure for Handling Asbestos Gaskets in not in compliance with OSHA 29 CFR 1910.1001.

CONCERN: (MC.1-3) (H1/C1) Numerous safety deficient procedures are being used for potentially hazardous activities.

FINDINGS:

o Corporate Policy 11A-1, which follows Boeing Company Policy 5H1, commits to an effective Quality Assurance Program "to ensure that all contractual requirements are carried out to the customer's satisfaction in an efficient manner"

* Neither the Boeing Company policy nor BPS policy specify that QA should be utilized as a management tool (a communication channel independent of line management), however, in practice BPS management does make such use of QA on an informal basis.

o Corporate Policy 11A-1 establishes that each employee is personally responsible for the quality of his work and all managers are responsible for the quality of work performed under their direction. A Quality Improvement Program (Boeing Company-wide) has been initiated by BPS. The purpose of this program is to enhance the line employee sense of responsibility for quality.

* Taken in combination, the BPS Quality Assurance Program Plan and the BPS Quality Assurance Program meet the program requirements of DOE 5700.6B, except with respect to shipping and transportation. (See ST.1 and ST.2)

* BPS subcontractors are required to conduct activities in accordance with BPS safety requirements or under a BPS approved contractor's plan. Subcontractors are responsible for safety training of their personnel. The BPS auditing of subcontractors for this requirement is minimal.

* Some onsite contracts are the prime responsibility of DOE and contain no requirements for safety oversight by the site organization except for establishing safety precautions for contractor SWPs.

* Contractors responsible directly to DOE were in lesser compliance with site policy as exemplified by (1) failure to wear goggles while pouring concrete and (2) failure to secure

compressed gas cylinders at West Hackberry. It is clearly the perception of BPS personnel that these contractors are complying with less stringent requirements.

* Site management is not privy to safety and emergency plans of DOE-administered contracts and is not empowered to routinely review DOE prime contractor safety related working conditions. This lack has resulted in an inadequate level of communication and enforcement of BPS safety and health policy for DOE contractors compared to BPS subcontractors. (See IH.2-1.)

* Site drawings are largely controlled by the DOE A/E firm. A proposal for BPS to assume drawing control is under consideration.

CONCERN: (MC.1-4) (H2/C2) Safety is compromised by the site manager's lack of authority over all safety related site activities and governing documents.

FINDINGS:

* Performance appraisals of all salaried employees except managers are performed formally. Each employee summarizes his work activities for the year in writing. These summaries form the basis for assessment by the employee's supervisor or manager and a personal discussion of strengths and weakness. A sampling showed that safety and emergency management performance were not generally used as criteria. In addition, the infrequency of unfavorable comments in the evaluations appears inconsistent with overall organizational safety performance.

* Management performance appraisals are not documented.

* The personnel performance appraisal process is not being used effectively to reinforce good safety performance.

* It is recognized that a new position description approach and performance appraisal program, which is under development, may address these findings if effectively implemented.

CONCERN: See MC.6-1.

H.2 MANAGEMENT OBJECTIVES - MC.2

PERFORMANCE OBJECTIVE: Facility management objectives should ensure commitment to safe operation, including enforcement of work practices and procedures.

FINDINGS:

* Site management has a goal of zero recordable accidents. Employees recognize that this goal is extremely difficult to achieve, and consequently treat it rather cavalierly, resulting in ineffectiveness in meeting safety requirements. Site management has not acknowledged this situation, as evidenced by the lack of the establishment of, for example, sub-goals which are possible to meet and thus more readily internalized by employees.

o The safety administrator develops an annual set of qualitative and specific safety goals for the site. These goals are reviewed by the Site Safety Council and promulgated by the site manager. The Site Safety Council reviews progress towards these goals.

* There is a significant awareness of safety goals and personal responsibility for safety performance on the part of each employee. However, because site safety goals tend to be routinely stated (the same from year-to-year), employee performance can be adversely impacted.

* First line supervisors are not required to set individual goals to support site goals.

o Specific work objectives for each organizational unit are established by New Orleans staff through a top down planning effort based in part on the work breakdown structure (described in the BPS Management Plan, D506-01036-09). Safety is addressed in these planning efforts, through its priority consideration in the Systems Improvement Program, which is a key element in budget planning.

o The planning system assures that project, contractor, and unit objectives are consistent and complementary. In this system, safety is addressed through SWPs, as appropriate. In addition, work orders are reviewed by QA to ensure that safety requirements and QC hold points are included.

* The BPS Management Plan contains a mission statement which embodies ten broad goal statements. In addition, 25 priority activities are identified. No priority statements directly reflecting safety concerns are identified. One of the goal statements addresses safety in very general terms along with other matters.

CONCERN: (MC.2-1) (H3/C3)

The effectiveness of the safety program can be diminished by the minimal treatment of safety as an objective and as a priority by the BPS Management plan.

FINDINGS:

* Weekly staff meeting, scheduling meetings, periodic "all-hands" meetings and systematic identification, reporting, and tracking of problems provide a framework for management to follow progress towards achievement of objectives. Some deficiencies have not been handled in a timely manner, as noted elsewhere in this report.

CONCERN:

See MC.7-2.

o The Safety Management Plan describes the functions and responsibilities of the Site Safety Council. Its functional statement indicates that the Council is an element of line management (e.g., establishes safety goals, manages the line control safety program). In addition, the Council is viewed by cognizant employees as making decisions and instituting actions appropriate to line management. It is noted that the language used to define the responsibilities of the Site Safety Council and the site manager tends to obscure direct lines of authority and responsibility, with potential for decreased safety performance effectiveness. However, in practice, the Council acts in an advisory capacity to the site manager, who is also the Council chairman.

CONCERN:

None.

H.3 CORPORATE SUPPORT - MC.3

PERFORMANCE OBJECTIVE: There should be evidence of corporate interest and support for safe operations.

FINDINGS:

- o BPS Corporate Policy 12A1 incorporates Boeing Company Policy 1B7 "Safety and Health in The Work Environment".

- o BPS Corporate Policy 12A1 establishes the line control safety program and states that it is "our policy to comply with contractual requirements for safety, environmental, health, and medical practices". The above contractual requirements are established on the basis of SPR/PMO policy, "To assure that SPR operations do not adversely impact the environment, cause injury or illness to the public or SPR employees, or result in damage to private or government property."

- * Boeing Company Policy 8H1 establishes authority for all professional staffs involved with the occupational health and safety of employees to halt, order evacuation or otherwise control any practices or conditions which might be expected to result in death or serious physical harm. This statement establishes the priority of safety over program matters in cases of severe hazard. In addition, statements of safety policy, indicating that safety takes precedence over programmatic considerations (and thus more affirmative than Policy 12A), are found in a few lower tier BPS documents.

- * Statements of objectives and associated priorities delineated in the BPS Management Plan (D506-01036-09) do not reflect a level of safety concern commensurate with Boeing Company policy.

CONCERN: See MC.2-1

FINDINGS:

- o The BPS policy provides the basis for implementation of the line control safety program as described in the Safety Management Plan (D506-01002-09).

- o Feedback on the implementation of safety requirements is accomplished by communication on safety matters in the organization from the working level upward. This communication is facilitated by formally required safety meetings, telephone conferences, reviews, inspections, reports, and minutes of meetings of the Site Safety Council and the Executive Safety Committee. Communication downwards is formal, by means of policy statements, procedures, notices, meetings of the Executive Safety Committee, the Site Safety Council and employee safety meetings. Corporate oversight at the project manager's level is also accomplished by the above means.

o Communication between site and headquarters management is facilitated by site representatives for safety, quality assurance, fire safety, security and environmental matters. These site representatives serve dual functions of reporting directly to New Orleans corporate offices as well as providing technical advice and direct overview services to the site manager.

* Boeing Company demonstrates its corporate interest and support of the safety of BPS operations by its response to requests for specialized technical assistance and in audits of selected technical disciplines at BPS. The appraisal team reviewed the report of "Industrial Hygiene Audit of Boeing Petroleum Services", July 1988, by a Boeing Corporate Industrial Hygienist. The depth of the audit was insufficient to uncover some of the deficiencies found by the appraisal team. Also, some of the Boeing findings were not supported by the findings of the appraisal team. (See IH.2.)

CONCERN: See MC.5-4.

H.4 SAFETY CULTURE - MC.4

PERFORMANCE OBJECTIVE: An established safety culture should govern the actions and interactions of all individuals and organizations involved in plant operations.

FINDINGS:

- o The essence of an established safety culture is the perception of an awareness of, and sensitivity to, safety exhibited by employee attitudes throughout the organization. When employees routinely work safely, even without a conscious effort, a strong safety culture exists. Management's effort to promote this sensitivity and awareness in visible, well publicized programs demonstrates a commitment to reinforce and maintain the safety culture. A good safety culture is no guarantee that safe performance will be achieved, but safe performance cannot be achieved in the absence of an established safety culture. Because firm measures of safety culture are difficult to quantify, the following findings, gathered from throughout the report, illustrate examples of a positive safety culture that should be nurtured as well as negative indicators that the concerns in this report strive to correct.

- o Observations that reflect positively on an established safety culture include:

  - When BPS assumed responsibility for the SPR project, almost all line managers were promptly trained in the requirements of the Line Control Safety Program.

  - Boeing Policy 8H1 recognizes and establishes authority for all professional staffs involved with the safety and health of employees, to halt or control practices that might precipitate an imminent danger.

  - Site personnel demonstrate satisfactory sensitivity and awareness to the need and requirements to work safely.

  - Site personnel demonstrate personal accountability for safety. This is exemplified by an employee who conscientiously inspected his work site rather than waiting for a Safety Monitor to do it for him.

  - Site personnel consistently use appropriate protective equipment, solicit advice from the site safety administrator, and refer unfamiliar tasks to review committees to ascertain the safety requirements of the job.

- Motivation for employees to work safely is provided by an awards program for employees who work safely for a prescribed period.

- Site personnel are not reluctant to communicate safety problems to supervisors and the Site Safety Management Council.

- Safety matters are conscientiously addressed in Site Safety Management Councils and the Executive Safety Council which meet regularly and routinely to consider disposition of safety reports and employee concerns.

- Employee safety awareness and sense of responsibility for the safety of others is encouraged by regularly scheduled group safety meetings at which safety training topics are also discussed.

o Observations that tend to diminish an established safety culture are as follows:

  - The fact that employees do not describe safety duties in their annual performance reviews may indicate that their sensitivity to safety is not completely integrated into their daily tasks.

  - There is a lack of sensitivity to safety indicated by the BPS Management Plan in failing to list safety in the top 25 priorities.

  - Top management commitment to safety is not visible when safety performance expectations are not defined.

  - The lack of top management safety reviews at the sites could be interpreted as a lack of top management commitment to safety.

  - There is a perceived lack of accountability in that staff support personnel do not actively inject their expertise into the resolution of site safety problems unless it is specifically requested.

  - With respect to safety goals, there is an attitude among employees that some accidents may be inevitable.

  - Management is not inspiring employees and staff personnel to seek out problems by promoting a prevention philosophy.

- Employees become frustrated by the perception that some DOE contractors are not held to the same safety standards to which BPS employees are accustomed.

CONCERN: None.

H.5 MANAGEMENT ASSESSMENT - MC.5

PERFORMANCE OBJECTIVE: Management and supervisory personnel should monitor and assess facility activities to improve performance in all aspects of the operation.

FINDINGS

- o Managers and supervisors regularly perform formal reviews of the status and adequacy of conformance to safety requirements through safety meetings at the supervisory level and meetings of the Site Safety Council at the management level. Minutes of these meetings are maintained.

- * In the case of the Site Safety Council minutes at West Hackberry, no provision is made for identifying resolved items other than their omission from the listing of old business in subsequent minutes. This could lead to insufficient attention to important safety matters.

- o At Big Hill, safety concerns are carried in the minutes until resolved and documented therein.

- * The Site Safety Council at West Hackberry has inadequate procedures to assure that closure has been achieved on safety issues which are addressed in Council meetings.

CONCERN: See MC.1-1 and MC.1-3.

FINDINGS:

- o Surveillance of subcontractor work by onsite cognizant personnel is required (for example, at West Hackberry, Construction Management Procedures, D506-01090-09). These activities are conducted under surveillance plans developed in accordance with CM-A-14. QA audits are also conducted to verify compliance with requirements and to document and track deficiencies until they are resolved.

- o The site manager performs safety performance-oriented walk-through inspections of selected work areas monthly and makes frequent informal walkthroughs.

- o Performance-oriented monthly zone inspections are performed by small teams of management. These are coordinated by maintenance and are aimed principally at maintenance items, but also incidentally address safety concerns.

- * The safety administrator performs regular formal and frequent informal safety inspections; however, he does not regularly participate in zone inspections. Safety inspections, noted above, are reported both to the site manager and to Safety, NOLA.

* Specialized safety experts are not being fully utilized in zone inspections.

* The appraisal Team found numerous deficiencies in materials and equipment, many of which were obvious in cursory inspections. These examples are summarized here and further discussed in other sections of the report as indicated in the parenthetical references.

  - (PP.4) Deficiencies in emergency equipment exist and are not being promptly corrected.

  - (MA.1) Numerous material and equipment deficiencies that should be routinely detected, reported and corrected are not being observed.

* Electric shock and hazardous material storage hazards are known to exist but have not been corrected because some personnel lack occupational safety knowledge and experience. (OS.5).

CONCERN: (MC.5-1) (H1/C2) Numerous undetected but readily observable material and equipment deficiencies and numerous known but uncorrected deficiencies at the sites indicate a lack of sensitivity toward safe working conditions.

FINDINGS:

* There are no formal site requirements for the use of trending, root cause analysis, or lessons learned approaches, although these techniques are informally utilized at the sites. Such analyses are a documented function of Systems Engineering in New Orleans.

* Systems Engineering root cause analysis obtains its input from site reporting of equipment failures and maintenance work orders. Thus, it is focused on equipment failures and does not address a major source of safety concern embodied in personal failures and procedural deficiencies.

* Quality Assurance collects, trends, and analyzes procedural compliance issues to detect procedural deficiencies.

* "Near-miss" events are not reported.

CONCERN: (MC.5-2) (H2/C2) Root cause analyses of safety deficiencies related to human performance and procedures are not adequate.

FINDINGS:

* The system for dissemination to employees of information necessary for safe operation is a formal set of top- level procedures supplemented by site-specific procedures, work place meetings, classroom and on-the-job training, and the SWP

system. Deficiencies and inadequacies in these provisions have been found by the review team and are addressed specifically in other sections of this report.

- o A system of surveillances by safety supervisors, line managers, foremen, and safety monitors supplemented by zone inspections and headquarters audits is employed site-wide.

- o Self audits as required by "Management Surveillance of the Safety Program", 120P-1, are generally conducted (but not documented) by site personnel. BPS subcontractors are monitored to the requirements of the Safe Work Permit system.

- * Line personnel are trained in fire fighting and spill control but are not knowledgeable in fire prevention, detection and fire protection engineering fundamentals. (See FP4).

- * Safety professionals, or adequately-trained site personnel, are not generally employed in the walkthroughs and surveillances which limits the effectiveness of this activity.

- * Despite BPS audits, surveillances and inspections, as noted above, the appraisal team has discovered numerous examples of unsafe acts and equipment as documented in the Operations, Maintenance, and Fire Protection sections of this report.

CONCERN: (MC.5-3) (H1/C1) In many instances, audits, surveillances, and inspections result in the identification and reporting of only rudimentary safety hazards and deficiencies.

FINDINGS:

- o Numerous formal reviews and audits have been conducted at the sites, e.g., Maintenance Effectiveness Audit, QA audit, site safety inspections, and others.

- o The audit activities are currently in process of being combined into an integrated audit program called the Management Effectiveness Audit (MEA.) This audit is designed to replace the individual audits, to improve audit effectiveness and decrease the cumulative impact of the individual audits on site operations.

- o The MEA incorporates performance objectives for Operation, Maintenance, Fire Protection and Safety as well as other relevant disciplines.

- o The MEA had not occurred at Big Hill or West Hackberry at the time of this appraisal, so the process was appraised by examining the MEA for Sulphur Mines.

- * The structure of the MEA is based on answering "yes" or "no" to a large number of narrow topical questions.

* The principal focus of the criteria in the MEA is verification that procedures and resources are in place to perform site functions, but the criteria do not adequately address the quality of the procedures and resources or the adequacy of the results of their application.

* BPS supplements the MEA in the safety discipline by semi-annual site safety inspections. One of the site safety reports was reviewed. The site inspection was performed in accordance with a formal check list. The checklist focused on the detection and correction of deficiencies and did not address root causes.

CONCERN: (MC.5-4) (H2/C2) Overview activities related to site safety do not adequately address quality of performance and basic causes of deficiencies.

FINDINGS:

o All accidents, both BPS' and subcontractors', are required to be reported formally in conformance with DOE 5484.1A.

o Corrective action to prevent the recurrence of deficiencies is addressed by QAD 16. This procedure provides a framework for a corrective action program to be undertaken.

o Quality Assurance (QA) is tasked with assuring that corrective actions taken adequately address recurrence of problems.

o QA performs trend analysis of deficiencies related to compliance with procedures to ascertain adequacy of procedures.

* No Unusual Occurrence Reports (UORs) have been filed by DOE headquarters during 1988 by West Hackberry or Big Hill. However, four UORs have been initiated by these sites during the year.

o At West Hackberry, events which are considered to be potential UORs are reported to the site UOR coordinator (safety administrator). These are provided informally through the New Orleans UOR coordinator to the cognizant DOE assistant project manager, who decides if a UOR is to be formally submitted. If one is required, it is written by the site UOR coordinator.

* Event reporting is not required to catch "near misses" as required by DOE 5000.3 and the guidance in the order is not being adequately followed in regard to event level and breadth.

* At Big Hill there is no UOR coordinator and the coordinator actions described above are taken by cognizant management.

* Classification of specific events by DOE as UORs does not comply with DOE 5000.3 and can lead to inadequate involvement of the performing organization in the UOR process. (See TS.2)

* Other examples of failure to comply with DOE Orders and Federal, state, and local regulations have been identified by the appraisal team. They are summarized here and further discussed in sections of this report as indicated by the parenthetical references.

  - (PP.4) At both sites, medical personnel are not provided as required by DOE 5480.8.

  - (PP.4) The radio tower lighting at West Hackberry does not meet the requirements of FAR Part 77.

  - (FP.5) The safety of ERT members cannot be assured at West Hackberry because of excessive travel distances to existing crash gates and personal safety at NOLA is jeopardized by poor maintenance of emergency routes.

  - (FP.6) The sites fail to fully meet "Improved" or "Highly Protected" risk criteria as required to comply with DOE 5480.7.

  - (ST.6) BPS is not in compliance with 49 CFR and Louisiana and Texas state transportation regulations concerning transportation of hazardous materials.

  - (TS-2) Event reporting (e.g., UOR process, safety reports) is not required to capture "near-misses", consequently valuable safety data is being lost. In addition, the UOR guidance for reportable events is not being followed. (See DOE 5000.3)

  - (MC.5) Classification of specific events as UORs by DOE, does not comply with DOE 5000.3 and can lead to inadequate involvement of the performing organization in the UOR process.

  - (FP.1) BPS Fire Protection Management Plan fails to address all pertinent DOE 5480.7 requirements.

  - (FP.3) BPS Operational Procedure IOP-1 "Goals, Responsibilities, and Functions of SPR Fire

Protection" references DOE 5480.7 but does not list the requirements contained in it.

- (MA.6) The new API crane at the West Hackberry offsite water intake has not been given an initial load test as a unit, as required by OSHA regulations.

- (IH.7) At Big Hill, no medical monitoring has been conducted for many workers using respiratory protection, which is in violation of DOE 5480.8 and OSHA 29 CFR 1910.134.

- (IH.5) The Respiratory Protection Program is not adequately administered by all sites, is not adequately supported by the NOLA Safety Department, and is not uniformly in compliance with OSHA 29CFR 1910.134.

* Handling of asbestos filled gaskets (22 OP-3) is not in compliance with OSHA 29 CFR 1910.1001.

CONCERN: (MC.5-2) (H1/C1) The many noncompliances with regulations and orders found by the appraisal team can potentially lead to unsafe working conditions and environmental risk.

H.6 PERSONNEL PLANNING AND QUALIFICATION - MC.6

PERFORMANCE OBJECTIVE: Personnel programs should ensure that positions are filled by highly qualified individuals.

FINDINGS:

- o The formal personnel program is conducted by the Human Resources department, NOLA.
- o A succession tree for key management positions has been developed by BPS.
- o Actions taken to anticipate and fill non-management vacancies at the sites are informally handled. Some efforts are undertaken to identify and provide special training for replacement candidates for key positions. There is no formal requirement for this.
- * Position descriptions, mainly functional, are available for a substantial number of non-managerial positions. Few of these functional statements are accompanied by educational, experience and other qualifications. Formats vary widely. The functional statements reviewed were not dated or approved; thus, their status is uncertain.
- * Sporadic efforts have been made to review, evaluate and revise these functional statements. There is no BPS policy requiring the site to maintain a file of applicable job descriptions.
- * Current practice limits position descriptions to functional statements with no identification of educational training or experience requirements until a personnel requisition is being developed to fill a vacancy. Site management's position is that this policy is not appropriate and job qualifications should be developed independently of the personnel requisition, and that these criteria should be established and documented together with functional job statements.
- * BPS has not defined position descriptions in terms of the site mission and functions. There are no provisions or criteria for job accountability. A plan has been initiated to rectify this situation but will not be fully implemented for some time.
- * Employees who describe their jobs in annual performance reviews seldom mention safety as a significant portion of their work activity.
- * There is no reluctance to communicate information on hazards observed or known; however, there is insufficient emphasis on reporting root causes of safety matters to higher levels, or

perhaps insufficient analyses of root causes are performed. In either instance, a sense of responsibility/accountability is not promoted when employee safety performance is not routinely measured against a documented and understood description of functions and responsibilities.

CONCERN: (MC.6-1) (H2/C2) Safety duties and responsibilities are not clearly documented and communicated to employees as (H2/C2) a significant and accountable part of their job.

FINDINGS:

* Provisions exist for educational support and training for employees (Corporate Policy 8A-14). These provisions are for developing management personnel; however, they are not implemented in a planned way that could maximize their effectiveness.

* Site safety supervisors appoint safety monitors in accordance with 12OP-2. The safety monitors are given some verbal instructions and a "Safety Monitor Manual" dated January 1988. There is neither evidence nor records that safety monitors are trained to the full scope of that manual. Safety monitors do receive some training at some sites.

* Some safety monitor assignments are rotated as frequently as quarterly which scarcely leaves time for on-the-job training (OJT) or formal training. There is apparently no incentive to be selected for this collateral duty.

* Site Safety Council personnel have had formal training in the line management control system, but formal training of site non-management personnel is limited. Training records at some sites are poorly documented and not consistent with the system described in New Orleans.

* Systems to assure that Operations and Maintenance personnel receive adequate initial training and periodic retraining in all needed technical and safety areas are not in evidence.

* Additional deficiencies in the training activity are discussed in other sections of the report as indicated by the examples in the parenthetical references below.

  - (PP.3) Lessons learned through exercises and drills are generally not used to modify and improve training.

  - (ST.6) There is a lack of training in corrosion control for technicians making cathodic protection measurements.

- (ST.3) A number of training deficiencies are identified related to shipping and transportation.

- (OP.5) Operator trainees are not tested to determine their training status. Qualification documentation does not exist for operators.

- (MA.2) Hazards identification training has been given to only a limited number of site personnel. The training has not resulted in an increased awareness of hazards as verified by the appraisal team.

- (IH.1) Documentation of industrial hygiene training is deficient leading to difficulty in assessing who has been trained in specific disciplines and techniques.

* Assuring that personnel are properly trained is a line management responsibility; however, there is no one assigned to overview the training effort to make certain that management is meeting all the training needs.

* Some examples of "trained personnel" not recognizing hazards and defects are:

  - Technicians have left the 5000 volt floor insulation rolled up in the main switch gear buildings next to the 69,000 volt substation.

  - Ground straps rusted off and/or not used on vacuum trucks.

  - A trained boat operator made several trips to the intake site despite gasoline fumes emanating from the bilge.

  - A welding rod heater is frequently turned off despite procedures to the contrary.

  - Personnel smoking in the Control Room.

  - Materials control clerk not recognizing defective slings in the storeroom.

CONCERN: (MC.6-2) (H1/C1) Control mechanisms are lacking to assure that training for BPS and subcontractors is adequate, timely, and appropriate to job requirements.

H.7 DOCUMENT CONTROL - MC.7

PERFORMANCE OBJECTIVE: Document control systems should provide correct, readily accessible information to support facility safety requirements.

FINDINGS:

- o "Publication Control Procedures" (D506-01117-09, Rev 1) explains the process of organizing, writing, formatting, revising, and releasing BPS publications. A BPS publication is defined as any form of written material that establishes rules, records permanent data, delineates problems and their solutions or performs any combination of these functions. This distinction is taken to distinguish publications from other written materials such as letters, memos, proposals, etc.

- o QAD-6 establishes requirements for monitoring document control. In QAD-6 and in "Publication Control Procedures", a controlled publication is defined as a document such as a plan, policy or set of future company activities that will be periodically updated.

- o Support Services/Publication Control NOLA is responsible for document control which is achieved through implementation of operating procedure OP.1-3 "Issuance and Control of Publications."

- * This policy and procedure is not applied to site-specific procedures which are controlled at the sites. No overview efforts are made to ensure that proper control of the site specific procedures is achieved.

- o Procedure OP.1-3 assigns responsibility to the recipient of a controlled document for maintaining it current by insertion of controlled correcting pages, for keeping it in a useable condition and for returning it to Publication Control when it is no longer needed.

- o The latest authorized versions of applicable controlled documents are required to be available in work areas.

- o Out-of-date documentation is required to be removed from work areas and destroyed in coordination with Publication Control.

- o A record of all issued copies of controlled documents is required to be maintained by Publication Control to assure that holders of record are held accountable.

- o Quality Assurance (QA) is provided with an opportunity to review and comment on controlled publications in accordance with "Publication Control Procedures".

o On site, the library maintains two copies of all controlled documents for lending purposes. These are treated the same as documents assigned to individuals.

* Proper operation of the system is required to be verified by Quality Assurance in accordance with QAD-6; however, interviews indicate that audits of individual documents in user's possession are inadequate.

* As-built drawings are produced by Walk-Haydel and to a lesser extent by Engineering, NOLA, and maintained in the site library. Red line drawings are maintained current by contractors and by Construction Management during implementation of Engineering Change Proposals. Some deficiencies in proper operation of this part of document control are noted (See TS.1-1 and PP.4).

o Control of obsolete drawings is achieved by retrieving and filing the field drawings as a part of the work task package and by destruction of the library copy when a superseding version is received.

* A number of examples of deficiencies in the adequacy and availability of documents important to safety of personnel for normal operation and response to emergencies are discussed in other sections of the report as indicated in the parenthetical references.

- (PP.2) The Fire Plan does not contain all necessary information such as location of electrical power cut off installations and hazardous chemicals and does not include temporary buildings.

- (PP.5) Control Room operators do not have workable guidance available for recognizing, classifying, and assuring correct response to major emergencies.

- (PP.2) The status of emergency plans and related documentation is uncertain because of violations of document control procedures.

- (FP.1) At West Hackberry, the Fire Safety Specialist does not have documentation regarding the location of classified electrical equipment areas of the plant.

- (OS.1) Policies, guidelines, and instructions for occupational safety issues are either unavailable or not consolidated in a manual.

- (OS.3) There is no formal program to identify and rectify procedural deficiencies related to occupational safety.

- (FP.3) At West Hackberry, site specific procedures and guidelines are not available for employee instruction in (1) the proper storage of flammable and combustible liquids or (2) where the classified electrical equipment is used. Procedures have not been completed in NOLA to document site specific procedures.

- (OS.4) Level III criteria do not address all of the many hazards specific to liquid hydrocarbons.

CONCERN: (MC.7-1) (H2/C1) Procedures, drawings, and other guidance documents for normal and emergency work activities are in some cases not available, not complete, not adequately controlled, or are not effectively consolidated in a usable format for some functional areas.

FINDINGS:

* The Fire Protection Tracking System (FPTS) and the Hazards Abatement Tracking System (HATS) listed a number of items unresolved for years, in some instances. The timelines of resolution of these items is unsatisfactory. Examples of these items are discussed in other sections of the report as indicated by the parenthetical references.

  - (PP.4) The requirement for a site wide siren alert system has been in the tracking system since 1983.

  - (ST.1) The need for a leak detection system to monitor pipeline integrity for all crude oil transfer operations between West Hackberry and Sunoco has been an open item in HATS since April 6, 1981.

  - (OS.1) Numerous unresolved occupational safety related hazards have been tracked in HATS since their identification in 1981-1982.

  - (FP.4) The issue of the Big Hill fire water source reliability and adequacy is not being resolved in a timely manner.

* The Site Safety Analysis Report for West Hackberry was written in 1981 and updated in 1985. Residual hazard issues were

entered into HATS and are tracked statured until resolved. A number of significant changes in the operation have been implemented in the meantime. Newly identified hazards identified from design changes have been implemented. However, it is not clear that some potential accident scenarios have been adequately analyzed. (e.g., single pump seals, explosion hazard associated with the slop oil tank).

* For the West Hackberry site, a large number of deficiencies and safety problems were identified in the SAR. These were transferred to the HATS where a significant number remain unresolved. HATS is frequently augmented by newly discovered deficiencies where they are tracked pending resolution. A similar, but not so severe, problem is found at Big Hill.

CONCERN: (MC.7-2) (H2/C2) The retention of unresolved safety matters in FPTS, HATS, and other tracking systems for up to eight years degrades the safety significance of such items and the value of the tracking systems.

FINDINGS:

* Introductory statements in appendices to the Big Hill Final Safety Analysis Report for Leaching indicate that they were provided to assist DOE in its SAR review.

* A number of management personnel at West Hackberry were unfamiliar with the Safety Analysis Report but were familiar with the HATS system. The Safety Analysis Report for Big Hill is a more complete document, is current, and is used by managers to help provide cognizant personnel managers and other employees with a good context for safety concerns.

CONCERN: (MC.7-3) (H3/C3) The SAR is not utilized by line personnel at the sites as a working document to provide management and other employees with a proper context for safety concerns and a basis for procedures.

ATTACHMENT 1

System for Categorizing Concerns

A. Each concern contained in this report has been categorized for SERIOUSNESS by the following criteria:

CATEGORY I: Addresses a situation for which a clear and present danger exists to workers or members or the public. A concern in this category is to be immediately conveyed to the managers of the facility for action. At this point, consideration shall be given to whether a "clear and present danger" exists such that the facility shutdown authority of the Assistant Secretary (EH-1) should be exercised. If so, the Assistant Secretary or his designee is informed immediately.

CATEGORY II: Addresses a significant risk (but does not involve a situation for which a clear and present danger exists to workers or members of the public) or substantial noncompliance with DOE Orders. A concern in this category is to be conveyed to the manager of the facility no later than the appraisal closeout meeting for immediate attention. Category II concerns have a significance and urgency such that the necessary field response should not be delayed until the preparation of a final report and the routine development of an action plan. Any issues surrounding the concern or the suggested response should be addressed during the appraisal or immediately thereafter. Again, consideration should be given to whether facility shutdown is warranted under the circumstances.

CATEGORY III: Addresses significant noncompliance with DOE Orders, or suggests significant improvements in the margin of safety, but is not of sufficient urgency to require immediate attention.

B. Each concern made has also been characterized by the POTENTIAL HAZARD CONSIDERATIONS of the issues addressed or by the significance of its COMPLIANCE CONSIDERATIONS. Some concerns have been characterized in more than one of these groups when applicable. The criteria used are:

POTENTIAL HAZARD CONSIDERATIONS

Level 1. Has the potential for causing a severe injury or fatality, potentially fatal occupational illness, or loss of the facility.

Level 2. Has the potential for causing minor injury, minor occupational illness, major property damage, or has the potential for resulting in or contributing to unnecessary exposure to radiation or toxic substances.

Level 3. Has little potential for threatening safety, health, or property.

COMPLIANCE CONSIDERATIONS

Level 1. Does not comply with mandatory DOE requirements (DOE Orders), prescribed policies and standards, and documented accepted practice (the latter is a professional judgment based on the acceptance and applicability of national consensus standards not prescribed by DOE requirements).

Level 2. Does not comply with recommended DOE reference, standards, guidance, or with good practice (as derived from industry experience, but not based on national consensus standards).

Level 3. Has little or not compliance considerations; these concerns are based on professional judgment in pursuit of excellence in design or practice (i.e., these are improvements for their own sake--not deficiency-driven).

ATTACHMENT 2

Categorization and Tabulation of Concerns

In accordance with Attachment 1, all of the concerns have been categorized as Category III, for seriousness except for concerns FP.5-1, MA.1-1 and MA.2-1, which were given a Category II designation for seriousness. Concern FP.5-1 addresses the life safety hazards associated with the site cavern areas and High Pressure Pump Pad. Concern MA.2-1 addresses training requirements for BPS subcontractors. The contractor is developing action plans to respond to these concerns. Concern MA.1-1 points out numerous hardware, equipment, and material safety differences. Immediate corrective actions have been undertaken by the contractor on many of these findings.

The concerns were also characterized by potential hazard and compliance considerations. Attachment 2.A summarizes these characterizations. All of the concerns are listed in Attachment 2.B. The user is cautioned that to understand the full intent of any concern, it is necessary to read its basis in the related sub-section of Section II.

2. A. CATEGORIZATION OF CONCERNS

Concern Number	Potential Hazard Level	Compliance Level
PP. 2-1	2	2
OS. 4-1	1	3
IH. 2-1	2	1
IH. 3-1	2	1
IH. 4-1	2	2
IH. 5-1	2	1
FP. 5-1*	1	1
FP. 6-1	2	1
ST. 1-1	2	1
OP. 7-1	2	2
MA. 1-1*	1	2
MA. 2-1*	1	1
TS. 2-1	2	2
TS. 6-1	3	2
MC. 1-1	1	1
MC. 1-2	1	2
MC. 1-3	1	1
MC. 1-4	2	2
MC. 2-1	3	3
MC. 5-1	1	2
MC. 5-2	2	2
MC. 5-3	1	1
MC. 5-4	2	2
MC. 5-5	1	1
MC. 6-1	2	2
MC. 6-2	1	1
MC. 7-1	2	1
MC. 7-2	2	2
MC. 7-3	3	3

*Category II

2.B. TABULATION OF CONCERNS

A. PUBLIC PROTECTION (PP)

CONCERN: (H3/C2) — See MC.5-4

CONCERN: (H2/C2) — See MC.7-1.

CONCERN: (PP.2-1) (H2/C2) — Analyses of a wide range of credible accident scenarios to develop appropriate emergency response and to identify equipment needs that have not been performed.

CONCERN: (H2/C2) — See MC.6-2.

CONCERN: (H2/C2) — See MC.1-1.

CONCERN: (H2/C2) — See PP.2-1, MC.6-2, MC.7-1 and MC.1-1.

CONCERN: (H2/C2) — See MC.1-1.

CONCERN: (H2/C2) — See MC.5-1.

CONCERN: (H2/C1) — See MC.5-5.

CONCERN: (H2/C1, H2/C2) — See MC.5-5 and MC.7-1.

B.1 OCCUPATIONAL SAFETY (OS)

CONCERN: (H3/C2) — See MC.7-1.

CONCERN: (H2/C2) — See MC.7-2.

CONCERN: (H1/C2) — See MC.1-1.

CONCERN: (OS.4-1) (H1/C3) — Level III criteria do not account for nor address some hazards specific to liquid hydrocarbon transportation and storage at West Hackberry and Big Hill (i.e., specific situations where more stringent criteria and standards are to be considered).

CONCERN: (H2/C1) See IH.2-1.

CONCERN: (H2/C2) See TS.2-1.

B.2 INDUSTRIAL HYGIENE (IH)

CONCERN: (H2/C2) See MC.7-1.

CONCERN: (H2/C2) See MC.1-4.

CONCERN: (H2/C2) See IH.4-1.

CONCERN: (H2/C2) See MC.5-4.

CONCERN: (IH.2-1) (H2/C1) Many safety and health hazards have not been identified, quantified, evaluated, and corrected in an expedient manner.

CONCERN: (IH.3-1) (H2/C1) Program and procedural requirements vary from site to site in content and effectiveness, and no practice is in evidence to evaluate and standardize effective approaches SPR-wide.

CONCERN: (H2/C2) See MC.6-2.

CONCERN: (H2/C2) See MC.1-1.

CONCERN: (IH.4-1) (H2/C2) The management surveillance and line control safety programs are not being administered consistently or effectively by all departments within specific sites, and do not adequately serve to identify safety and health hazards and program deficiencies.

CONCERN: (IH.5-1) (H2/C1) The Respiratory Protection Program is not adequately administered at all sites, is not adequately supported by the New Orleans BPS Safety Department, and is not uniformly in compliance with OSHA 29 CFR 1910.134.

CONCERN: (H2/C2) See IH.2-1.

CONCERN: (H2/C1) See MC.1-3 and MC.5-5.

CONCERN: (H2/C2) See MC.6-2.

CONCERN: (H2/C2) See IH.2-1.

CONCERN: (H2/C1) See MC.5-5.

CONCERN: (H2/C1) See IH.2-1 and IH.3-1.

C. FIRE PROTECTION (FP)

CONCERN: (H2/C1) See MC.7-1 and MC.5-5.

CONCERN: (H3/C2) See MC.7-2.

CONCERN: (H1/C1) See MC.5-5 and MC.5-3.

CONCERN: (H2/C2) See MC.7-1.

CONCERN: (H1/C2) See IH.4-1.

CONCERN: (FP.5-1) (Category II) (H1/C1) The safety of ERT members cannot be assured at West Hackberry because of excessive travel distances to existing crash gates.

CONCERN: (FP.6-1) (H2/C1) The Sites fail to fully meet "Improved" or "Highly Protected" risk criteria required to comply with DOE 5480.7. See MC.5-5.

D. TRANSPORTATION AND SHIPPING (ST)

CONCERN: (ST.1-1) (H2/C1) No formal program exists to assure that hazardous materials transportation and shipping activities are conducted safely.

CONCERN: (H2/C3) See MC.7-2.

CONCERN: (H2/C1) See MC.1-3.

CONCERN: (H2/C3) See MC.1-2.

CONCERN: (H3/C1) See MC.7-1.

CONCERN: (H2/C1) See MC.6-2.

CONCERN: (H3/C1) See MC.7-1.

CONCERN: (H2/C1) See MC.1-1.

CONCERN: (H2/C1) See MC.7-1.

CONCERN: (H2/C1) See MC.5-5.

CONCERN: (H2/C1) See MC.5-5.

E. CONDUCT OF OPERATIONS (OP)

CONCERN: (H3/C3) See IH.4-1.

CONCERN: (H3/C3) See IH.3-1.

CONCERN: (H1/C2) See MC.1-3.

CONCERN: (H2/C2) See MC.5-1.

CONCERN: (H1/C2) See MC.6-2.

CONCERN: (H1/C2) See MC.1-3.

CONCERN: (H1/C2) See MC.1-2.

CONCERN: (OP.7-1) (H2/C2) The safety and integrity of the West Hackberry Control Room and its protection systems are lax.

F. MAINTENANCE (MA)

CONCERN: (MA.1-1) (Category II) (H1/C2) Numerous hardware, equipment, and material safety deficiencies are not being detected, reported, and corrected by the maintenance group.

CONCERN: (H2/C2) See MC.1-1 and MC.5-4.

CONCERN: (H1/C2) See MC.6-2.

CONCERN: (MA.2-1) (Category II) (H1/C1) Control mechanisms are lacking to assure that BPS workover contractor training meets job requirements.

CONCERN: (H1/C2) See MA.1-1 and MC.1-3.

CONCERN: (H1/C2) See MC.1-1.

CONCERN: (H1/C2) See MC.5-1.

CONCERN: (H2/C2) See MC.1-3.

CONCERN: (H1/C2) See MC.1-3.

G. TECHNICAL SUPPORT (TS)

CONCERN: (H2/C2) See MC.7-1.

CONCERN: (H3/C2) See MC.7-2.

CONCERN: (TS.2-1) (H2/C2) There is no effective program to distribute lessons learned from related industry experience nor to disseminate non-hardware lessons learned at all the sites.

CONCERN: (H2/C1) See MC.5-5.

CONCERN: (H2/C2) See MC.1-2.

CONCERN: (TS.6-1) (H3/C2) The component identification and calibration status is not consistently indicated on installed process instrumentation and measuring and test equipment.

CONCERN: (H2/C2) See MC.1-2.

H. MANAGEMENT CONTROL (MC)

CONCERN: (H1/C2) See MC.6-2.

CONCERN: (MC.1-1) (H1/C1) Some cognizant NOLA organizational units are not adequately exercising their line control safety responsibilities for site activities.

CONCERN: (MC.1-2) (H1/C2) Technical assurance overview is inadequately performed because of, for instance, lack of expertise, and inadequate training and personnel resources.

CONCERN: (MC.1-3) (H1/C1) Numerous safety deficient procedures are being used for potentially hazardous activities.

CONCERN: (MC.1-4) (H2/C2) Safety is compromised by the site manager's lack of authority over all safety related site activities and governing documents.

CONCERN: (H2/C2) See MC.6-1.

CONCERN: (MC.2-1) (H3/C3) The effectiveness of the safety program can be diminished by the minimal treatment of safety as an objective and as a priority by the BPS Management Plan.

CONCERN: (H2/C2) See MC.7-2.

CONCERN: (H3/C3) See MC.2-1.

CONCERN: (H2/C2) See MC.5-4.

CONCERN: (H3/C3) See MC.1-1 and MC.1-3.

CONCERN: (MC.5-1) (H1/C2) Numerous undetected but readily observable material and equipment deficiencies and numerous known but uncorrected deficiencies at the sites indicate a lack of sensitivity toward safe working conditions.

CONCERN: (MC.5-2) (H2/C2) Root cause analyses of safety deficiencies related to human performance and procedures are not adequate.

CONCERN: (MC.5-3) (H1/C1) In many instances, audits, surveillances, and inspections result in the identification and reporting of only rudimentary safety hazards and deficiencies.

CONCERN: (MC.5-4) (H2/C2) Overview activities related to site safety do not adequately address quality of performance and basic causes of deficiencies.

CONCERN: (MC.5-5) (H1/C1) The many noncompliances with regulations and orders found by the appraisal team can potentially lead to unsafe working conditions and environmental risk.

CONCERN: (MC.6-1) (H2/C2) Safety duties and responsibilities are not clearly documented and communicated to employees as a significant and accountable part of their job.

CONCERN: (MC.6-2) (H1/C1) Control mechanisms are lacking to assure that training for BPS and subcontractors is adequate, timely, and appropriate to job requirements.

CONCERN: (MC.7-1) (H2/C1) Procedures, drawings, and other guidance documents for normal and emergency work activities are in some cases not available, not complete, not adequately controlled, or are not effectively consolidated in a usable format for some functional areas.

CONCERN: (MC.7-2) (H2/C2) The retention of unresolved safety matters in FPTS, HATS, and other tracking systems for up to eight years degrades the safety significance of such items and the value of the tracking systems.

CONCERN: (MC.7-3) (H3/C3) The SAR is not utilized by line personnel at the sites as a working document to provide management and other employees with a proper context for safety concerns and a basis for procedures.

2.C CONCERN/REFERENCE CHARACTERIZATION MATRIX

Report Section	Total Referenced Concerns	PP.2-1 [2,2]	OS.4-1 [1,3]	IH.2-1 [2,1]	IH.3-1 [2,1]	IH.4-1 [2,2]	IH.5-1 [2,1]	FP.5-1 [1,1]	FP.6-1 [2,1]	ST.1-1 [2,1]	OP.7-1 [2,2]	MA.1-1 [1,2]	MA.2-1 [1,1]	TS.2-1 [2,2]	TS.6-1 [3,2]	MC.1-1 [1,1]	MC.1-2 [1,2]	MC.1-3 [1,1]	MC.1-4 [2,2]	MC.2-1 [3,3]	MC.5-1 [1,2]	MC.5-2 [2,2]	MC.5-3 [1,1]	MC.5-4 [2,2]	MC.5-5 [1,1]	MC.6-1 [2,2]	MC.6-2 [1,1]	MC.7-1 [2,1]	MC.7-2 [2,2]	MC.7-3 [3,3]
Public Protection	13	(2,2)														(2,2) (2,2) (2,2)					(2,2)			(3,2)	(2,1) (2,1)		(2,2) (2,2)	(2,2) (2,2) (2,2)		
Occupational Safety	5			(2,1)										(2,2)		(1,2)												(3,2)	(2,2)	
Industrial Hygiene	14			(2,2) (2,2) (2,1)	(2,1)	(2,2)										(2,2)		(2,1)	(2,2)					(2,2)	(2,1) (2,1)		(2,2) (2,2)	(2,2)		
Fire Protection	7					(1,2)																	(1,1)		(2,1) (1,1)			(2,1) (2,2)	(3,2)	
Transportation and Shipping	10															(2,1)	(2,3)	(2,1)							(2,1) (2,1)		(2,1)	(3,1) (3,1) (2,1)	(2,3)	
Conduct of Operations	7				(3,3)	(3,3)											(1,2)	(1,2) (1,2)			(2,2)						(1,2)			
Maintenance	9											(1,2)				(2,2) (1,2)		(1,2) (2,2) (1,2)			(1,2)			(2,2)			(1,2)			
Technical Support	5																(2,2) (2,2)								(2,1)			(2,2)	(3,2)	
Management Control	7															(3,3)		(3,3)		(3,3)				(2,2)		(2,2)	(1,2)		(2,2)	
Number of Times Referenced	77	1	0	4	2	3	0	0	0	0	0	1	0	1	0	9	4	8	1	1	3	0	1	4	9	1	8	11	5	0

(H,C) = Concern characterization
(H,C) = Reference characterization
H = Hazard level (1, 2, or 3)
C = Compliance level (1, 2, or 3)

Note: Concerns FP.5-1, MA.1-1, and MA.2-1 are Category Level II. All other concerns and references are Category Level III.

DOE F 1325.8
(12-84)

ATTACHMENT 3

United States Government

Department of Energy

memorandum

DATE: NOV 10 1988

REPLY TO ATTN OF: EH-321

SUBJECT: Multidiscipline Technical Safety Appraisal of the Strategic Petroleum Reserves

TO: Joe LaGrone, Manager
Oak Ridge Operations Office

This is to advise you that the Office of Quality Programs, Division of Quality Verification, is planning to conduct a Multidiscipline Technical Safety Appraisal of the Strategic Petroleum Reserves (SPR) in New Orleans, LA, West Hackberry, LA, and Big Hill, TX, during the period November 1988 through January 1989. This appraisal is an extension of the appraisal program that was initiated in 1985 in accord with Secretary Herrington's initiative to strengthen the DOE Environment, Safety and Health Program.

The appraisal will be conducted by a team of qualified specialists from the Office of Environment, Safety and Health (EH) and support contractors. Mr. Charles Grua has been designated as the team leader and Dr. Neal Goldenberg or Jerry Hulman as the EH senior manager. While the specific make-up of the team has yet to be determined, we envision approximately ten to twelve persons with expertise in various areas including fire protection, occupational safety, industrial hygiene, quality assurance/verification, transportation and shipping, and petroleum engineering.

The appraisal will emphasize the evaluation of objective evidence of the safe operating condition of the facilities. The appraisal team plans an orientation visit to SPR during the week of November 14, 1988, for briefings by the contractor and site familiarization tours at West Hackberry and Big Hill. The appraisal team would then return to monitor operations and observe activities related to specific disciplines. The effort will be divided into two site visits on December 5-13, 1988, and on January 9-17, 1989, and a visit to the Project Management Office at New Orleans on January 23 to February 1, 1989. They will investigate noted discrepancies, determine the status of hardware and systems, review operating documentation (records, procedures, log books, reports, etc.), interview operating and management personnel and verify findings with contractor personnel.

Arrangements for the appraisal have been developed with M. Smith, SPR/DOE and H. R. Andrews, Safety Manager for Boeing Petroleum Services, Inc., by the team leader. Copies of the DOE/SPR documents and Boeing Petroleum Services, Inc. (BPSI), policies, plans, organizational charts, manuals and appraisal reports will be requested to be forwarded to Headquarters. During the course of the appraisal, working space at the sites will be needed for the team. These details will be worked out with your staff.

The out-briefing will be held at the conclusion of the final visit to SPR Offices at New Orleans. The EH senior manager will attend the out-briefing.

I appreciate your cooperation and support for this important endeavor.

Richard W. Starostecki
Deputy Assistant Secretary
Safety, Health and Quality Assurance

cc:
E. C. Baynard, III, EH-1
J. A. Wampler, FE-1
P. J. Plaisance, SPR

ATTACHMENT 4

APPRAISAL TEAM COMPOSITION

MULTIDISCIPLINE TECHNICAL SAFETY ASSURANCE APPRAISAL
STRATEGIC PETROLEUM RESERVE

EH Management Oversight	Lewis G. Hulman Department of Energy Director, Office of Quality Programs
	Neal Goldenberg Department of Energy Director, Division of Quality Verification
Team leader	Charles Grua Department of Energy Division of Quality Verification
Technical Assistant	Gary Bruns Department of Energy Office of Quality Programs
Technical Editor	Michelle McGaffic ARINC Research Corporation
Coordinators	Mary Meadows Department of Energy Office of Safety Appraisals
	Frances Kimball Department of Energy Office of Safety Appraisals
	Barbara Bowers Department of Energy Office of Safety Appraisals
	Patricia Davidson Oak Ridge Associated Universities
	Lydia Reyes Westinghouse Idaho Nuclear Company

Liaison with the Team	Melissa W. Smith DOE/SPR, Director Environment, Safety, and Health
Public Protection	Rudy Engelmann Private Consultant
Personnel Protection Industrial Hygiene	Gary J. Gottfried Apex Environmental, Inc.
Occupational Safety	Patrick J. Doody Apex Environmental, Inc.
Fire Protection	James T. Blackmon Professional Loss Control
	Billy T. Lee Department of Energy Division of Quality Verification
Transportation and Shipping	James M. Shuler Department of Energy Office of Quality Programs
	Robert L. Paullin Engineering Consultant
Operations	Robert J. Cordes Petroleum Consultant
Maintenance	Carl W. Mangus Petroleum Consultant
Technical Support	Robert A. Babione ARINC Research Corporation
Management Control	Andrew J. Pressesky Private Consultant
	Henry P. Himpler, Jr. ARINC Research Corporation

ATTACHMENT 5

Biographical Sketches of Team Members

NAME: Charles Grua (Team Leader)

ASSOCIATION: DOE Headquarters, Office of Quality Programs

EXPERIENCE: 32 years

- o Department of Energy
  - QA Engineer - Office of Quality Programs. Manage and coordinate Technical Assurance Safety and Quality Assurance Appraisals of various DOE operations.
  - Environmental Control Technology Specialist. Managed programs and performed R&D studies to determine energy system control technology needs and to establish DOE regulatory development position.
- o Department of Interior
  - Program Manager - Office of Coal Research. Managed cost shared coal gasification and gas cleanup R&D programs.
  - Chief of Plant Engineering and Project Management Div. - Office of Saline Water. Directed activities of programs for state-of-the-art desalting facilities - international scope.
  - Resident Manager - Office of Saline Water. Managed construction and operation of RD&D plants at field locations.
- o National Institute of Health, Education, and Welfare
  - Engineer - Maintenance Section Staff Engineer supporting bio-medical research efforts.
- o Honeywell Corp.
  - Applications Engineer.
- o Lykes Bros. Steamship
  - Third Assistant Engineer.
- o United States Navy
  - Boiler and Machinery Officer.

EDUCATION: B.S., Marine Engineering, U.S. Merchant Marine Academy

OTHER: Member of American Society Mechanical Engineers, American Society for Quality Assurance

NAME: Robert A. Babione (Technical Support)

ASSOCIATION: ARINC Research Corporation

EXPERIENCE: 16 Years

- o ARINC Research Corporation
  - Senior Engineer. Reliability, availability, and technical safety assessment for energy technologies.
- o W. R. Holway and Associates
  - Senior Engineer. Fossil fuel power plant design engineering.
- o Coury and Associates
  - Senior Engineer. Geothermal process and systems development.
- o EG&G Idaho, Inc.
  - Senior Engineer. Nuclear facility engineering support and system design.
- o Stearns Roger, Inc.
  - Process Engineer. Fossil fuel and nuclear power plant design and construction support.
- o Westinghouse - Bettis Atomic Power Laboratory
  - Associate Engineer. Nuclear facility engineering support and system design.

EDUCATION: B.S., Mechanical Engineering,
Oklahoma State University

OTHER: Registered Professional Engineer -
Colorado and California

NAME: James T. Blackmon (Fire Protection)

ASSOCIATION: Professional Loss Central, Inc.

EXPERIENCE: 36 Years

- o Professional Loss Central, Inc. Oak Ridge, Tennessee
  - Senior Engineer: Fire Protection Engineering, development of hazardous materials HAZMAT training courses, fire hazards analysis.
- o University of Tennessee Knoxville, TN.
  - Assistant Professor (part-time), Graduate School (Industrial safety, fundamentals of industrial hygiene, fire protection, management of Safety/Health Programs)
- o Private Consultant Rockwell International Corporation.
  - Member Rocky Flats Safety Advisory Committee
  - Jensen Oven Company. Engineering design consultant and oven start-up
  - H and R Technical Associates, Inc. Wrote spill prevention counter measure plans for Y-12 and assisted in fire protection phase of ground transportation of chemical warfare agents safety analyses.
- o Union Carbide Corporation - Nuclear Division
  - (Y-12 Plant) Draftsman, Senior Draftsman Engineer, Plant Fire Protection Engineer
  - (ORGDP) Manager Safety Analysis Department
  - (ORNL) Manager Engineering Manager Environmental Department

EDUCATION: B.S. in Public Administration, University of Tennessee
M.S. in Safety Education, University of Tennessee
Ed.D in Safety/Health, University of Tennessee

OTHER: Executive Member National Safety Council Chemical Section
Chairman NFPA Vacuum Funn. Sectional Committee (86 D)
Former General Chairman NFPA ovens and Furnace Committee (#86)
Former member NFPA Atomic Energy Committee (803)

NAME: Gary Bruns (Technical Assistant)

ASSOCIATION: Department of Energy

EXPERIENCE: 4-1/2 years

- o Department of Energy (DOE), Office of Quality Programs, Washington D.C.
  - Active participant in Reactor Operator Fundamentals Training courses; DOE/EH Weekly Seminar on Technical, Management, or Safety issues; Assist in Technical Safety appraisals at various DOE facilities. Responsible for the development of computer systems for safety related information exchange; also involved with assisting in evaluating and reporting daily events and issues to DOE facilities for management evaluation and resolution. Research reports, manuals and technical material.
- o University of Illinois, Champaign/Urbana American Nuclear Society student-branch officer. Organized, managed and coordinated projects related to the Department of Nuclear Engineering.

EDUCATION: B.S., Nuclear Engineering, University of Illinois, Champaign/Urbana

OTHER: Member of American Nuclear Society

NAME: Robert J. Cordes (Operations)

ASSOCIATION: Robert J. Cordes & Associates

EXPERIENCE: 31 years

- o Robert J. Cordes & Associates
  - President. Providing petroleum industry safety consultant services, which include expert witness, inspections, investigations and program development.
- o Marathon Oil Company
  - Safety Supervisor; Safety & Training Coordinator; and Environmental & Safety Coordinator. Responsible for the safety, training, and environmental aspects of Marathon's production operations in the Gulf of Mexico.
  - Senior Risk Engineer. Responsible for inspecting refineries, gas plants, product terminals, fuel gas plants, pipeline terminals and production, both offshore and onshore.
  - Safety Representative; Supervisor of Safety & Security. Responsible for safety during a $100 million plant expansion at a 200,000 B/D refinery.
  - Design Engineer. Involved with selection, design and operation of refinery equipment.
  - Process Engineer. Daily involvement with operations at refinery process units.

EDUCATION: B.S., Mechanical Engineering, Washington University, St. Louis, MO

OTHER: Certified Safety Professional
Active in the API Safety and Fire Protection Committee Meetings
Currently involved with rewrite of ANSI Z117 Confined Space Standard
Member ANSI Z244 LO/TO Standard Committee
Member: American Society of Safety Engineers

NAME: Patrick J. Doody (Occupational Safety)

ASSOCIATION: Independent Consultant

EXPERIENCE: 40 years

- o Apex Environmental, Inc.
  - Technical audit and safety consultant to the Petroleum Industry

- o Sarawak Shell Berhad (SSB)
  - Manager Technical Audit. Performed technical safety assessments for Shell International Group Company in Malaysia for offshore drilling and production facilities.

- o Shell Oil Company
  - Safety Engineer Advisor; Preparation of technical safety manuals and guidelines relating to oil and gas drilling and producing facilities and operations. Evaluation and commentary on engineering designs and specifications of onshore and offshore producing facilities, including safety systems and controls, fire protection and emergency evacuation. Onsite safety audits of onshore and offshore drilling and producing installations, facilities and operations.

EDUCATION: B.S., Civil Engineering, Gonzaga University
M.S., Civil Engineering, Harvard University

OTHER: Chairman, American Petroleum Institute Production Safety Committee, 1980-1987
Member, American Petroleum Institute Subcommittee to prepared RP 54, "Occupational Safety and Health Drilling and Wall Servicing Units" 1979

NAME: Rudolf J. Engelmann (Public Protection)

ASSOCIATION: Global Atmospheric Response

EXPERIENCE: 38 Years

- o Global Atmospheric Response
  - Consultant in emergency preparedness, global change and atmospheric behavior.
- o National Oceanic and AtmosphericAdministration.
  - Chief of Scientific Staff. Planning, review, and oversight of oceanographic, atmospheric, and solar-terrestrial research.
- o United Nations Environment Programme
  - Division Deputy Director Program direction and assessment for the U.N. Climate Impact Program, the global ozone problem, and the global CO_2 climate change problem.
- o Departments of Commerce and Interior
  - Director, Outer Continental Shelf Environmental Assessment Program. Directed oceanographic research on the Alaskan shelf in support of oil and gas exploration and development.
- o Atomic Energy Commission
  - Deputy Manager - Environmental Program, Division of Biology and Medicine.
  - Chief of Fallout Studies Branch Planned and managed environmental research conducted by national laboratories and contractors.
- o Battelle Northwest, Hanford Atomic Plant
  - Meteorologist. Research in turbulence, diffusion, and precipitation scavenging.
- o General Electric/USAF
  - Aviation and operational weather forecasting.

EDUCATION: B.A., Mathematics, Augsburg College
Graduate Studies - G.E. School of Nuclear Engineering - New York University
PhD., Atmospheric Sciences, University of Washington

OTHER: Member, American Meteorological Society
Member, American Geophysical Union
Member, Air Pollution Control Association
Member, American Nuclear Society

HONORS: Distinguished Alumnus, Augsburg College
Outstanding Young Men in America
Who's Who in Science
Who's Who In America

NAME: Gary J. Gottfried (Industrial Hygiene)

ASSOCIATION: Apex Environmental, Inc.

EXPERIENCE: 14 years

- o Apex Environmental, Inc.
  - Principal, Industrial Hygienist. Responsible for conducting industrial hygiene, public/occupational health and safety and environmental programs. Concentration in the petroleum industry, utilities, and laboratory environments. Manage and perform studies involving programs, hazard assessment and control, and health and safety program development implementation.
- o Biospherics Incorporated
  - Vice President, Director - Responsible for operations of the Industrial Hygiene and Laboratory Divisions including business development, program development, and supervision of over 100 industrial hygienists, chemists, and environmental scientists.
  - Managed major industry and government contract efforts. Performed technical programs as an industrial hygienist and chemist. Led and managed major environmental and hazard assessments, industrial hygiene surveys, laboratory studies, and health and safety programs.

EDUCATION: B.S., Chemistry, Purdue University

OTHER:
Certified Industrial Hygienist by the American Board of Industrial Hygiene, 1983
EPA Accredited Asbestos Inspector and Management Planner.
Treasurer, AIHA, Potomac Section, 1988-1989
President, AIHA, Potomac Section, 1985-1986.

NAME: H. P. Himpler, Jr. (Technical Support/Management Control)

ASSOCIATION: ARINC Research Corporation

EXPERIENCE: 33 years

- o ARINC Research Corporation
  - Principal Engineer/Sr. Project Leader. Consultant to the Department of Energy (DOE) in Auditing and Quality Assurance Program Planning. Project Management Consultant to DOE Weapons Program. Quality Assurance Consultant to DOE Defense Waste Management Program. Reliability/Maintainability Consultant to Gas Centrifuge Project. Project Consultant to Navy Cruise Missile, Sonobuoy, and Cost Estimating Programs
- o Raytheon Company
  - Engineering Manager. Test, Evaluation, and Maintenance Engineering Department
  - Senior Engineer. Principal designer of automatic test and instrumentation systems.
- o General Electric Co.
  - Quality Control Engineer. Overview of test, inspection, operations, and maintenance.
- o Westinghouse Electric Corporation
  - Manager, Environmental Test. Supervised component and systems qualification testing.
  - Project Engineer. Supervised design of test systems and equipment.
  - Engineering Aide. Designed radar systems, communication systems, and advanced development systems components.

EDUCATION: B.S., Electrical Engineering, John Hopkins University
B.S., Industrial Technology, Roger Williams College

NAME: Billy T. Lee (Fire Protection)

ASSOCIATION: DOE/HQ, Office of Quality Programs

EXPERIENCE: 26 years

- o DOE/HQ, Office of Quality Programs
  - Fire Prevention Engineer. Fire Safety review, inspection, and appraisal activities. Review and monitor fire research.
- o National Institute of Standards and Technology (formerly National Bureau ofStandards)
  - Research Fire Prevention Engineer. Project leader for studies in fire test method development, fire performance validation and testing.
- o Naval Facilities Engineering Command
  - Fire Prevention Engineer. Inspection of Naval facilities. Review of facility plans, design, and construction.
- o SRI International and Naval RadiologicalDefense Laboratory
  - Chemical Engineer
- o Aerojet General and UTC
  - Aerothermal Engineer

EDUCATION: B.S., Chemical Engineering, University of California (Berkeley)
M.S., Mechanical Engineering, University of Santa Clara

OTHER: Registered Fire Protection Engineer

NAME: Carl W. Mangus (Maintenance)

ASSOCIATION: Private Consultant

EXPERIENCE: 35 years

- o Private Consultant
  - Consultant to legal firms. Crane and wire rope failures, offshore workboat safety operations, crew, and helicopter helipad facilities.
  - Consultant to Offshore Producing Companies. Assisted in development of Offshore Operating Procedures. Performed technical safety survey of offshore/onshore oil and gas producing/ processing facilities.
- o Shell Offshore, Inc.
  - Senior Staff Technical Safety Specialist. Performed technical safety review/approval of engineering and operating procedures.
  - Manager of Offshore Regulatory Affairs. Formulated/commented on government regulations/industry standards.
  - Superintendent Offshore Production and Maintenance; Offshore Engineering Section Leader.
  - Project Manager. Projects included Calumet Gas Processing Plant, North Terrebonne Natural Gas Processing Plant Expansion, Dual 36" Natural Gas Pipelines, Chalkley Gas Processing Plant.
  - Project Developer - Gas Department Proposed, organized, and supervised seven natural gas processing plant projects.
- o Independent Contractor
  - Various duties on workover rigs, drilling rigs, and pipeline construction projects.

EDUCATION: B.S. Mechanical Engineering
Registered Professional Engineer, State of Louisiana

OTHER: Member, American Society of Safety Engineers Society of Petroleum Engineers, and Gulf Coast Safety and Training Group
International Association of Drilling Contractors, Offshore Operators Committee
U.S.Coast Guard Committees
American Petroleum Institute (API) Committee on International Production Regulatory Activities (CIPRA)

NAME: Robert L. Paullin (Transportation & Shipping)

ASSOCIATION: Principal, Paullin Consulting Services

EXPERIENCE: 39 years

- o Paullin Consulting Services
  - Principal. Management consultant - organization development and training and project management. Engineering consultant - transportation and pipeline safety; aircraft accident investigation. Expert witness - pipeline safety and aircraft safety.
- o GLH, Inc.
  - Senior Partner. Advisor to the Timken Company. Project Manager, Continental Telephone Company.
  - Consultant and Trainer - Institute for Professional Education; U.S. Department of Agriculture Graduate School.-Project Engineer - Applied Ordinance Technology and United Technologies.
  - Project Manager - Marks Research.
- o George Washington University, Washington, D.C.
  - Adjunct Professor, School of Engineering Management.
- o U.S. Department of Transportation.
  - Director, Office of Pipeline Safety.
  - Director, Office of Operations and Enforcement, Hazardous Materials and Pipeline Safety.
  - Director, Office of Research and Development.
  - Director, Office of Noise Abatement.
  - Director, Systems Analysis Office - Federal Aviation Administration.
- o Civil Aeronautics Board.
  - Special Assistant to the Director - Office of Safety.
- o Douglas Aircraft Company.
  - Chief Flight Safety Engineer.
  - Flight Test and Research Engineer.
- o Peter Kiewit and Sons, Inc.
  - Operations and Maintenance Engineer.

EDUCATION: DPA, University of Southern California
M.S., Civil Engineering, U.C. Berkeley
B.S., Mechanical Engineering, South Dakota School of Mines and Technology

OTHER: Member, Project Management Institute
Registered Professional Engineer, District of Columbia
Member, Professional Societies.

NAME: Andrew J. Pressesky (Management Controls)

ASSOCIATION: Private Consultant on Nuclear Energy Development and Regulation

EXPERIENCE: 43 years

- o Private Consultant
  - Consultant to the Department of Energy (DOE). Participated in Technical Safety Appraisals at Y-12, Oak Ridge National Labs (ORNL), High Flux Beam Reactor (HFIR) - Brookhaven and Experimental Breeder Reactor II - Argonne West. Also performed design reviews for the N- Reactor, the Savannah River Production Reactors, and the High Flux Isotope Reactor - ORNL. Completed management review of the ORNL and follow-up reviews at Y-12 and HFIR.
- o Private Consultant
  - Consultant to A/E. Audited all nuclear programs for quality assurance including three commercial power plants under construction.
- o American Nuclear Society
  - Staff to the chairman of the Source Term Committee.
- o Department of Energy (DOE)
  - Manager - Program Division. Responsible for reactor development and execution of line management for nuclear safety and quality assurance.
- o Milletron Inc.
  - Vice President, Engineering
- o Westinghouse Testing Reactor
  - Manager, Scientific Support
- o Isotope Products, Ltd.
  - Technical Director
- o National Research Council
  - Manager, Critical Experiment Program

EDUCATION: B.E., Engineering Physics, University of Saskatchewan, Canada

NAME: James M. Shuler (Transportation & Shipping)

ASSOCIATION: DOE Headquarters, Office of Quality Programs

EXPERIENCE: 14 years

- o U.S. Department of Energy, OQP
  - Manager, Packaging and Transportation Safety Program. Assess transportation safety of DOE activities
- o U.S. Department of Transportation, Office of Hazardous Materials Transportation
  - Radioactive Materials Enforcement Specialist. Inspected over 1700 shipper and carrier facilities throughout the U.S.
- o Applied Technology of Barnwell, Inc.
  - Radwaste/Transportation Specialist. Established packaging and transporta- tion brokerage service, provided cost/ benefit analyses for shipping radwaste, provided health physics coverage for reactor outages.
- o Chem-Nuclear Systems, Inc.
  - Customer and Compliance Representative. Provided technical assistance for customers shipping radwaste for disposal.
  - Supervisor of Health Physics. Accepted all radwaste for disposal, provided environmental monitoring for disposal site, provide health physics coverage for all operations.
- o Allied-General Nuclear Services
  - Health Physics Technician. Provided health physics, environmental and industrial safety coverage for a nuclear fuel reprocessing plant and an uranium hexafluoride facility.

EDUCATION: M.S., Radiation Science, Georgetown University
M.A., Management and Supervision, Central Michigan University
B.S., Botany, Clemson University

OTHER: Registered Radiation Protection Technologist
Associate Staff Instructor, U.S.Department of Transportation (USDOT), Transportation Safety Institute
Visiting Instructor, Georgetown University
Member, Health Physics Society
Member, American Nuclear Society
Member, Association of MBA Executives