3.0 Worker Safety and Health

Although several significant government and contractor organizational changes have occurred since implementation of corrective actions for the 1989 DOE Tiger Team assessment findings, PORTS has maintained a low injury/accident rate. These changes include transitioning enrichment operations to USEC, splitting regulatory oversight responsibility for various aspects of Plant operations between DOE and NRC, and selecting a new DOE prime contractor to manage Plant operations. The scope of work managed by DOE and performed by DOE contractors since the transition of enrichment operations to USEC has been more limited. Work activities focus on maintenance of UF_6 cylinders and DOE cylinder yards; characterization, repackaging, and shipment of packaged waste; assessment and mitigation of environmental impacts; and infrastructure maintenance of facilities, utilities, and grounds controlled by DOE. DOE contractor work activities and operations involve significant chemical and radiological risk from repackaging and characterizing wastes and other industrial risks associated with facility operations.

The worker safety and health programs at Portsmouth reflect a continuing evolution of programs and a transition from a single management and operating contractor to a management and integrating contractor responsible for oversight of an increasing number of PORTS subcontractors. The DOE maintains a ten-person Site Office, with two members having direct safety and health oversight responsibility.

X-744G Converter Shell Storage

Bechtel Jacobs has been the management and integrating contractor for the PORTS since April 1998. During that time, staffing levels have fallen from 139 in April 1998 to a permanent staffing level of about 50. The eight-person Bechtel Jacobs safety and health staff consists of a manager; staff specialists in industrial hygiene, industrial safety, criticality safety and radiation protection; and three environmental specialists. The remainder of the approximately 250-person work force at PORTS is employed through 12 Bechtel Jacobs subcontractors.

During this investigation, Bechtel Jacobs was transitioning all remaining direct work for site services, infrastructure maintenance, and waste operations to WASTREN, Inc., a new subcontractor that employs over three-quarters of the subcontracted workforce on site. The transition resulted in a new work control system for site service maintenance and waste operations work activities. Most Bechtel Jacobs maintenance and waste operations personnel assumed similar positions with the new subcontractor, thereby maintaining some continuity. Two personnel (the work control manager and project manager) were new to Portsmouth, but they have extensive experience at other DOE facilities and are supported by a number of Scientific and Ecology Corporation radiation control technicians, an industrial hygiene technician, and several environmental support staff. The remaining workers under the new subcontractor are essentially the same USEC hourly workers previously used by Bechtel Jacobs.

The Bechtel Jacobs integrated safety management system (ISMS) supplement issued in July 1999 prescribes the Bechtel Jacobs approach for flowing down the functions and principles of integrated safety management to the work execution level. The ISMS supplement emphasizes the five core functions of safety management and how they relate to the work breakdown structure, project, task, and activity planning. It further specifies certain elements of the core functions that are essential to planning and safely conducting work:

- Maintaining a commitment to clearly identify work and ensure that the worker has all the information to perform the work without injury

- Performing appropriate hazard analysis for all work, including that of subcontractors, and conducting pre-job briefings for workers who did not participate in those hazard analyses
- Establishing controls that include corporate policies, best management practices, and regulatory requirements in ES&H plans, procedures, and other work-control documents
- Safely performing the work using engineered controls, administrative controls, and personal protective equipment and clothing
- Conducting post-job briefings to elicit feedback, identify lessons learned, and promote program improvement.

The investigation team evaluated worker safety and health by reviewing work control systems, operations/procedures, radiation protection, and occupational safety and health. These areas are discussed in the following sections. Table 5 summarizes observed weaknesses in the ISMS core functions.

3.1 Work Control Systems

The investigation of current work control programs examined work practices and work control documentation both before the transition of site services, maintenance, and waste operations activities to the subcontractor and shortly after (three weeks) the new subcontractor had accepted these responsibilities. The investigation team observed work activities; reviewed corporate and Plant procedures, program documents, assessment reports, and work packages; and interviewed managers, supervisors, workers, job planners, and ES&H personnel.

Since the transition, the work control system is evolving toward a better defined and documented system. The Plant services, maintenance, and waste operations subcontractor restarted plan-of-the-week scheduling of work activities required by work control procedures and eliminated the use of "minor" work orders, which lacked hazard evaluation sheets and feedback forms. All post-transition work packages now include formal hazard evaluation sheets, assignment of craft workers by name, job estimates, material lists, and worker feedback forms. Work requests are individually authorized by the maintenance supervisor's signature.

Observation of work and interviews indicated that craft workers were generally knowledgeable of the technical tasks that they were required to perform. The craft workers considered safety their highest priority and stated that they would not feel intimidated about raising safety concerns. Bechtel Jacobs and the subcontractor recognize a number of work control transition deficiencies identified by the investigation team and are working to correct them.

The investigation team identified a number of program and implementation deficiencies in both the pre- and post-transition work control processes. The weaknesses were identified in implemented programs and elements specifically addressed in the Bechtel Jacobs ISMS supplement. The deficiencies were most evident in the implementation and adherence to regulatory and procedural requirements and the performance of specific reviews and activities called out in the ISMS supplement. The issue in this section reflects weaknesses in all integrated safety management five core functional areas and indicates the lack of full integration of ES&H and integrated safety management requirements into work control documents and activities.

Issue

Issue 7. The Bechtel Jacobs ISMS supplement, which specifies elements and requirements on how to plan and execute work, is not effectively implemented at the working level. There are program weaknesses and implementation deficiencies in work control processes in all core function areas that can affect worker and facility safety.

- There were many cases where work was not adequately defined. For example, work requests had the scope of work as "do the PM" without specifying what preventive maintenance (PM) to do, "Repair the Panel," and "Troubleshoot and repair." While "troubleshoot and repair" is a common term, there were no instructions or limits, written or verbal, to the craft workers to bound the scope of repairs. During interviews, craft workers could not define thresholds for returning the work request to supervision or planning for more instructions, additional hazard analysis, or re-approval. In some cases, workers had to have the maintenance supervisor call the "customer" to determine what work needed to be done. While this practice is expected, it should be done as part of the planning process, not after the work request is approved and released to the craft for work.

Table 5. Weaknesses in ISMS Core Functions

Weaknesses in ISMS programs and implementation resulted in deficiencies in worker safety programs in the five ISM core functions. Some elements and procedural requirements credited in the Bechtel Jacobs ISMS supplement are not yet effectively implemented. The deficiencies can result in unsafe work and affect worker safety.

Define The Work

- RWP "anticipated conditions" often reflect current postings rather than an analysis of expected work conditions.
- Work scopes were not fully defined in a number of Plant services work requests.
- Work requests that included both troubleshooting and repairs did not bound the scope of repairs.
- A priority system to define and assign routine work based on risk has not been implemented.

Analyze Hazards

- Isotopic characterization of facilities and operations has not been fully performed.
- Some procedures did not receive unreviewed safety question determination screening as required by DOE Order 5480.21.
- Work requests do not consistently identify and document all hazards for specified work activities.
- Some chemical and toxic material characterizations are not sufficiently analyzed to assess and document worker exposures.
- Exposure assessments are not routinely documented for noise, hazardous chemicals, and ergonomics.
- The exposure assessment requirements of DOE Order 440.1A were not documented.
- Thresholds for involving industrial hygiene in analyzing hazards for routine work are not adequate.

Develop/Implement Hazard Controls

- A number of subcontractor safety and health procedures are not fully implemented.
- Some RWPs were solely based on verbal information without a supporting hazard analysis.
- There were numerous administrative errors in pre- and post-transition work requests.
- The subcontractor procedure system was in transition and not fully implemented as required by TSRs.
- Some work requests did not identify specific controls for hazards, such as lockout/tagout and confined spaces.
- For a few safety and health programs, training was not adequate or had not been completed.
- Radiological air monitoring programs required by 10 CFR 835 did not have a sufficient technical basis.
- Subcontractor medical programs are not in full compliance with DOE Order 440.1A.

Perform Work Safely

- While workers were performing preventive maintenance, most lights were turned off without the occupants' knowledge.
- Violations of RWP requirements were identified during the performance of work.
- Before transition, L Cage drum work was performed without full consideration of all hazards.
- DOE personnel who were not in the bioassay program entered areas requiring bioassay program participation.
- Procedural violations were observed while workers handled drums during batching operations.
- A number of deficiencies were identified in hazard documentation for in-process work requests.

Feedback and Improvement

- Breathing zone air sampling and radiological equipment calibration issues were not promptly addressed.
- Feedback from craft workers and post-job reviews by supervision have been limited and not documented.
- P/QA involvement in Plant services post-job reviews was minimal.
- The self-assessment program did not reveal a number of deficiencies identified by the investigation team.
- The review process for determining subcontractor readiness to proceed is inadequate to assure that programs are in place.

- A documented priority system, required by procedure PO-WP-2209, "Work Control," Revision 2, to define and assign work based on risk has not been implemented. Pre- and post-transition work requests had no assigned priority either on the work requests or on the plan-of-the-week schedule. Procedure PO-WP-2209 requires preparation of a "priority work schedule" and ensuring that "the weekly priority work schedule is adhered to." The work control procedures and preventive maintenance procedures do not fully describe acceptance criteria on action to be taken when equipment fails preventive maintenance. Therefore, one work request involving failed preventive maintenance on emergency egress lights was not given appropriate priority, and the emergency egress lights remained out of service for several days.

- For Plant services maintenance work prior to transition, Bechtel Jacobs was not developing plan-of-the-week schedules or doing performance monitoring required by procedure PO-FM-P2209, "Maintenance Management." Due to resource limitations, some planning and scheduling functions had not been performed for some time. The new Plant services, maintenance, and waste operations subcontractor has resumed weekly work schedules.

Cylinder Storage

- In numerous work packages, administrative requirements were not being adhered to, resulting in work package deficiencies. Supervisors had signed work requests as closed, with no signatures indicating that the work was completed. Hazard controls were not listed for some work, and work instructions for performing some work were not adequate. Priority blocks were left blank on most work requests, and work requests requiring material were marked as "no material required."

- The pre- and post-transition work control system does not fully implement formal pre-job briefings; acknowledge that craft workers understand the scope and limitations of the work, the hazards, and the controls; document the actual work performed; or require post-job reviews. The pre-job briefings observed for Plant services maintenance were cursory, no checklist was used, and they were not documented. Bechtel Jacobs procedure PO-FM-P2209, "Maintenance Management," and WASTREN procedure PO-W2209, "Work Control," do not adequately address pre- and post-job briefings.

- There were training deficiencies on the SOMAX computerized work control system and on lockout/tagout requirements. Therefore, craft workers and supervisors were not familiar with all fields on the work request and what information should be in each field. Training deficiencies in lockout/tagout resulted in observed lockout/tagout procedure violations during work activities that had potential for injury. The subcontractor is taking action to provide additional training for workers and supervisors in lockout/tagout, hazard communication, and confined spaces.

- Safety-significant deficiencies were identified during observation of work activities. Prior to transition, L Cage drum work was performed without adequate consideration of all chemicals in the drums. For heating, ventilating, and air conditioning work, a non-permitted confined space was not identified, documented on the work package, or understood by workers. During preventive maintenance testing on egress and safety shower lighting, most lights in X-622 were turned off without the occupant's knowledge even though the work request was signed that the customer was notified. Affected personnel were not informed immediately prior to starting work to ensure that conditions were satisfactory for starting the work. For heating, ventilating, and air conditioning work, craft workers did not fully understand and/or adhere to the requirements of the lockout/tagout system. For example, in one instance, craft workers did not test the equipment to verify lockout/tagout; craft workers had been using a single maintenance lockout for multiple craft in violation of requirements; and

craft workers had not been using danger tags with red locks as required by Occupational Safety and Health Administration (OSHA) and Plant procedures. Management took prompt action to provide additional training in lockout/tagout and confined space to workers and supervisors.

- Feedback and improvement systems required by DOE Policy 450.4, *Integrated Safety Management,* for Plant services maintenance and waste operations day-to-day work activities are not fully implemented. Feedback was not fully effective for pre-transition minor work orders and post-transition work packages.

  - There is only one maintenance supervisor for all Plant services maintenance craft who must review all work requests and hazard information, perform pre- and post-job briefings, solve emerging maintenance problems, and review and sign for completed work.

  - Morning meetings with the maintenance craft workers are informal and ineffective as safety meetings. During one safety topic discussion, three of 16 craft workers were reading newspapers, indicating a cultural problem. Safety topics were not pre-planned, pre-assigned, and based on lessons learned.

  - An effective self-assessment program for work control is not in place. A rigorous self-assessment program in both pre- and post-transition work control programs should have identified and corrected many of the work control deficiencies identified by the investigation team.

Gas Centrifuge Enrichment Plant Building

  - The Bechtel Jacobs ISMS supplement states that "P/QA participates in post-job briefings and collects information for use on the next similar job." Bechtel Jacobs Performance and Quality Assurance (P/QA) involvement in Plant service maintenance and day-to-day waste operations work activities is minimal, and post-job briefings are not conducted for most Plant services maintenance. A sampling of about 50 work requests indicated little feedback from craft workers.

Conclusion

The work control processes for both Plant services maintenance and waste operations work activities are evolving toward a more rigorous and documented program. The new Plant services, maintenance, and waste operations subcontractor has implemented improvements such as eliminating unplanned work (i.e., minor work requests), and has added hazard evaluation sheets and feedback forms to all work packages. As a result of the investigation team's findings, several actions have been initiated to improve the work control system. As an example, Bechtel Jacobs ES&H personnel now participate in development or review all work request hazard evaluation sheets to ensure that hazards are adequately identified. These and other changes, with improved procedure adherence, will strengthen the work control system. Bechtel Jacobs and the subcontractor recognize that considerable work is required to complete transition and integrate requirements and practices into a fully effective work control program. Pre-job briefings to ensure that workers understand job hazards and post-job reviews to strengthen feedback and improvement are fundamental elements of integrated safety management that require improvement. Deficiencies in programs and implementation of ISMS elements, such as properly defining work, identifying hazards, and developing and adhering to controls, require additional DOE and Bechtel Jacobs management attention. Strengthened oversight of work activities to overcome implementation deficiencies and cultural barriers will improve safety.

3.2 Operations/Procedures

The investigation team examined a number of operations and work activities to determine the extent to which formality of operations was present and whether work was being performed in accordance with procedures. Activities observed included weighing and accountability operations in L Cage in Building X-326, cylinder inspection and handling activities, pre-task

hazard review meetings, plan-of-the-day (or plan-of-the-shift) meetings, and responses to alarms. The investigation team also examined a range of procedures, shift and operations logs, and unreviewed safety question determinations and screenings.

DOE delineates the policy and expectations regarding conduct of operations at DOE facilities in DOE Order 5480.19, *Conduct of Operations Requirements for DOE Facilities*. Although PORTS currently maintains eight hazard category 2 nuclear facilities, OR elected not to include DOE Order 5480.19 in the work smart standards set for Bechtel Jacobs and did not include an equivalent set of requirements for conduct of operations to ensure that performance expectations and objectives for safety, quality, and operations are met as required by the work smart standards process. Consequently, emphasis on the rigorous conduct of operations philosophy that is necessary for PORTS hazard category 2 nuclear facilities is inadequate. For example, a comprehensive Bechtel Jacobs corporate procedure on use of procedures was cancelled and replaced with a procedure describing the procedures program that provides minimal guidance on use of procedures. Bechtel Jacobs maintains corporate-level conduct of operations procedures for activities such as log-keeping and independent verification; however, at least one project level manager responsible for operations at PORTS was unaware of their existence.

The PORTS SAR assumes that operations are carried out by procedures that adapt DOE Order 5480.19 requirements to local operations, and that the associated technical safety requirements (TSRs) require a formal conduct of operations program encompassing elements of DOE Order 5480.19. TSRs also require formal issuance of new procedures and revisions in accordance with approved procedures. Contrary to those requirements, Bechtel Jacobs allowed the subcontractor to begin work on site without an approved conduct of operations program or an approved procedure change control process in place. This subcontractor began work with some procedures not developed, reviewed, and approved as required by TSRs and 10 CFR 830.120. Bechtel Jacobs reviewed and accepted key technical procedures prior to the subcontractor assuming responsibilities; however, some procedures approved by this subcontractor after assuming responsibility differed from the Bechtel Jacobs procedures they replaced. This subcontractor made the changes to correct previously known deficiencies in the procedures; however, unreviewed safety question (USQ) screenings or determinations were not performed on these changes as required by DOE Order 5480.21.

X-744Y Storage Yard

With the exception of the previously known deficiencies discussed above, the original Bechtel Jacobs technical procedures were generally comprehensive and technically accurate. In addition, many of the employees actually performing work in the facilities are either Bechtel Jacobs workforce transition or third-tier subcontract USEC employees and are competent and familiar with formal conduct of operations programs and activities required by the NRC or previously required by the Bechtel Jacobs program. Workers are aware of their stop-work rights and responsibilities. Pre-job meetings and other pre-task hazard meetings generally address appropriate material, and personnel freely participate in discussions. As a result, major floor-level conduct of operations deficiencies are not yet apparent at PORTS. Significant DOE and Bechtel Jacobs management attention is needed, however, to ensure that these deficiencies are promptly addressed to prevent degradation of worker performance. The issues in this section address weaknesses in procedure development, implementation, and control as well as limitations on the effectiveness of the Bechtel Jacobs readiness assessment program.

Issues

Issue 8. Procedures are not always adequately developed, implemented, and controlled as specified in the SAR and TSRs. Consequently, emphasis on the rigorous conduct of operations necessary for PORTS hazard category 2 nuclear facilities is below the level of rigor assumed in the PORTS SAR.

- The Bechtel Jacobs procedure describing the development, review, approval, and use of procedures does not adequately ensure quality

development and use of procedures by the workers. The Bechtel Jacobs corporate guidance on the procedure process, PQ-A-1100, "Procedure Document Process," is deficient in several areas:

- The list of events or activities requiring a procedure is not based on the hazard level of the activity and does not address use of a procedure as a hazard control.

- Risk- or hazard-based criteria for determining the types of technical procedure ("general intent" or "in-hand") are not provided.

- Although the procedure requires verification and validation of procedures, it does not reference or include adequate verification and validation checklists or other suitable guidance.

- The procedure provides minimal guidance on use of procedures, does not fully describe the SAR assumptions on procedure use for different types of procedures, and implies that following the sequence of steps in a procedure is not important unless the procedure is designated as "in-hand." No guidance specific to "general intent " procedures in provided. Bechtel Jacobs procedure PMMS-1001, "Use of Procedures," contained more extensive guidance but was deleted and replaced by PQ-A-1100, "Procedure Document Process."

- Bechtel Jacobs allowed the Plant services, maintenance, and waste operations subcontractor to begin work without an established, implemented, and maintained conduct of operations program as required by the TSR and SAR. Administrative Control 5.4.7 in the approved TSR requires a conduct of operations program to be established as described in SAR Section 11.4. The Plant services, maintenance, and waste operations subcontractor is currently working on redlining and approving existing Bechtel Jacobs conduct of operations procedures; however, the program was not required in their contract, and as a result, the associated procedures have a low priority for completion and implementation. The lack of conduct of operations procedures is a significant weakness in TSR administrative control implementation.

- Bechtel Jacobs allowed the Plant services, maintenance, and waste operations subcontractor to issue and use procedures without an approved document change control process in place as required by 10 CFR 830.120 and the TSRs, and without a USQ review process in place as required by DOE Order 5480.21. Consequently, several subcontractor procedures containing changes in intent were approved, issued, and used to perform work in hazard category 2 nuclear facilities without USQ screenings as required by DOE Order 5480.21. 10 CFR 830.120 states that "Documents shall be prepared, reviewed, approved, issued, used, and revised to prescribe processes, specify requirements, or establish design." It also states that "Work shall be performed to established technical standards and administrative controls using approved instructions, procedures, or other appropriate means." TSR Administrative Control 5.3 states that "Procedures shall be kept current by formal issuance of new procedures and revisions in accordance with approved procedures." Subcontractor corporate quality assurance standards contain criteria addressing procedure development and approval; however, this subcontractor does not have an approved procedure for development, review, approval, and use of procedures at PORTS. In addition, their procedure on USQ reviews was still being developed. Examples of intent changes included a pressure setpoint change to a point below the manufacturer's recommended operating parameter in one procedure, and in several procedures, steps were added or deleted, notes were added, and precautions were changed. While no immediate safety hazards were discovered and many of the changes were made to correct known problems with the procedures, these improperly authorized and implemented changes indicate deficiencies in conduct of operations and safety basis configuration control, and require significant senior management attention to correct. The failure to perform the USQ screenings was reported as an off-normal occurrence. Bechtel Jacobs placed a hold on work performed by the Plant services, maintenance, and waste operations subcontractor until a document change control process was in place.

- The subcontractor work control procedure lacks the detail necessary to ensure quality work practices. For example, PO-W2209, "Work Control," this subcontractor's procedure governing work at PORTS, does not address details of the use, roles, and responsibilities for the SOMAX computerized

work control system. It does acknowledge that there is a SOMAX system but does not adequately describe the SOMAX work priority system or the hazards section of the SOMAX work request.

- Radiological control activities are not always conducted according to established technical standards, procedures, or administrative controls. Some Lockheed Martin procedures currently used for radiological control equipment calibration have not been reviewed and approved for use by the Bechtel Jacobs PORTS Radiological Control organization (see Section 3.3, "Radiation Protection"). No equivalent procedures that have been screened for USQs as required by DOE Order 5480.21 and approved by Scientific and Ecology Corporation are in place. This is not in accordance with 10 CFR 830.120, which requires activities in nuclear facilities to be performed in accordance with approved procedures.

X-343 Feed Vaporization Sampling Facility

- Some industrial hygiene procedures have not been fully implemented. For example, a number of the responsibilities assigned to line managers, industrial hygiene, health services, and the training group have not been implemented in the following procedures: Hazard Communications, Bloodborne Pathogens, Ergonomics, Occupational Noise Exposure and Hearing Conservation, and Workplace Sampling. Examples include worker area hazard communication training, labeling of some chemicals, training for some workers in accessing the Material Safety Data Sheet (MSDS) database, evaluating job tasks for ergonomic hazards, performing noise surveys and/or personnel monitoring and periodic assessments, maintaining current hearing conservation participation lists, and identifying potential exposure groups for bloodborne pathogens and developing exposure plans. Additional examples appear in Issue 15.

Issue 9. Bechtel Jacobs has not implemented an effective readiness assessment process, as stated in the ISMS supplement. As a result, Bechtel Jacobs allowed WASTREN to assume operations of hazard category 2 nuclear facilities without ensuring line management readiness for safe nuclear operations.

- Bechtel Jacobs did not perform a readiness assessment as required by the Bechtel Jacobs ISMS policy before allowing the Plant services, maintenance, and waste operations subcontractor to assume operations. The ISMS supplement (BJC/OR-146, Integrated Safety Management System Supplement, July 1999) states that readiness should be evaluated when there is a change in contractor or major subcontractor. The ISMS supplement references DOE Order 425.1A, *Startup and Restart of Nuclear Facilities*, and DOE-STD-3006-95, *Planning and Conduct of Operational Readiness Reviews*, and further describes the focus and expectations of readiness reviews. Procedure PQ-A-1510, "Readiness Evaluations," the Bechtel Jacobs procedure describing the process for the establishment and conduct of operational readiness reviews and readiness assessments, does not provide criteria to ensure that readiness evaluations are considered in the subcontracting process. Consequently, in WASTREN's case, the procedure would not have triggered any type of readiness evaluation. Furthermore, this procedure was not included in the redlining process for development of this subcontractor's new procedures.

- Although the ISMS supplement references DOE Order 425.1A for reviews prior to changes in contractors or major subcontractors, that Bechtel Jacobs Procedure "STR Requirements for Subcontract Execution" does not address the potential for an operational readiness review or readiness assessment as a prerequisite before the notice to proceed is issued to a subcontractor.

- During the recent OR ISMS combined Phase I and II verification of Bechtel Jacobs, several operations functional area criteria were met based on Bechtel Jacobs performance of a formal PQ-A-1510

readiness assessment for the transition to the new Plant services, maintenance, and waste operations subcontractor at PORTS. The lack of a formal readiness assessment and subsequent identification of deficiencies in procedures and conduct of operations call into question the validity of the ISMS verification results.

Conclusion

Most of the employees performing work in the DOE facilities are competent and familiar with formal conduct of operations programs and activities required by the NRC or previously required by the Bechtel Jacobs program. Pre-job and other pre-task hazard meetings generally address appropriate material, and personnel freely participate in discussions. However, the rigor of operations does not meet DOE expectations for hazard category 2 nuclear facilities, particularly in the development, implementation, and control of procedures. This deficiency results from a lack of line oversight by OR regarding Bechtel Jacobs implementation of conduct of operations and nuclear safety requirements as normally expected by DOE policy. Deficiencies were apparent during the operational transition to WASTREN. Bechtel Jacobs allowed this subcontractor to assume operations with major deficiencies in their conduct of operations and unreviewed safety question determination programs; this is contrary to the Plant TSRs and the contract. Significant management attention is needed to restore attention to the details of DOE nuclear safety requirements at hazard category 2 nuclear facilities.

3.3 Radiation Protection

Bechtel Jacobs has contracted with the Scientific and Ecology Corporation to provide health physics services for DOE operations at PORTS and other operations managed by Bechtel Jacobs. The mission of the Bechtel Jacobs/Scientific and Ecology Corporation radiological control program is to provide protection for individuals from radiological exposures that could result from of DOE activities at PORTS. These activities have changed during the 1990s with the transition of gaseous diffusion operations to USEC, and currently, DOE's responsibilities include environmental restoration, maintenance of infrastructure (including non-leased facilities), and management of legacy contamination and radioactive wastes at the Plant. Despite the mission change, the nature, extent, and magnitude of contaminated facilities and uncharacterized materials at the Plant present unique challenges and highlight the need for a comprehensive radiological protection program.

As part of meeting these challenges, Bechtel Jacobs corporate has developed a radiological control operations guide to assist the organization in meeting 10 CFR 835 requirements. This guide has supplanted a wide range of procedures that were previously used at PORTS (and other sites) in execution of the radiological control program. This guide addresses all five DOE sites where Bechtel Jacobs provides support; however, not all PORTS appendices include site-specific guidance at this time. Bechtel Jacobs is in the process of developing the balance of this guide.

The issues in this section address weaknesses in radiological characterization, a lack of formality and discipline in the development and implementation of the radiological protection program, and limitations in the radiological air sampling program regarding the detection and evaluation of the level or concentration of airborne radioactive material.

Issues

Issue 10: Incomplete radiological characterization of the workplace adversely affects the radiological control organization's ability to identify hazards and institute controls necessary to ensure consistent and appropriate radiological protection for workers.

- The lack of facility-specific isotopic data adversely impacts radiological control hazard assessment processes. The inaccessibility of specific information related to the radioisotopic mix in

X-616 Former Sludge Lagoon

specific work areas directly impacts the effectiveness and accuracy of the air sampling, contamination control, and bioassay/dosimetry programs. Interviews conducted indicated that, although radiological control management had previously identified determinations of need and requests for funding to characterize the Plant over a period of three years, Bechtel Jacobs and their predecessor did not assign appropriate priority, nor did DOE approve these requests. Consequently, isotopic characterization of facilities and operations has not been conducted, nor has data from previous Lockheed Martin characterization efforts been incorporated into current program documents to support analysis and control of radiological hazards.

- While the PORTS radiological control organization acknowledges two areas (i.e., X-705E and X-701B) where transuranic contaminants are present in sufficient quantity to require radiological controls, specific knowledge of the isotopic mix is lacking in other work areas. Preparation for operations with potential radiological control impacts relies heavily upon the process knowledge of key personnel and limited waste isotopic data to establish radiological controls, rather than documented technical bases. Therefore, hazard analysis may rely upon incomplete radiological data.

- Bechtel Jacobs has allocated funding to characterize sites managed by Bechtel Jacobs. During the investigation, the Bechtel Jacobs Corporate Health Physics Manager discussed plans to undertake radiological characterization activities at facilities managed by Bechtel Jacobs as a result of the Paducah Corrective Action Plan, and provided the investigation team with a statement of work for the subcontractor selected to accomplish the task. The characterization activity is scheduled for completion in June 2001.

Issue 11: There is a lack of rigor, formality, and discipline in the development, maintenance, and implementation of the Bechtel Jacobs radiation protection program that impacts effective control of the hazards associated with radiological work.

- The radiation work permit (RWP) program at PORTS is not always consistently implemented.

  - Cases were identified where the RWP program gave workers inaccurate radiological information pertaining to work area conditions. For example, the Bechtel Jacobs RWP's sections on anticipated radiological conditions reflect the current radiological postings in the work area, not the conditions anticipated during performance of the designated work activity. Many surveys used for radiological control purposes were not representative of current area configuration. Bechtel Jacobs routinely uses historical radiological survey data to complete the radiological condition sections of RWPs without assurance that radiological conditions have not changed since the last survey was completed.

  - Bechtel Jacobs has not assured that health physics requirements for Bechtel Jacobs personnel accessing USEC facilities are effectively captured by the Bechtel Jacobs RWP program. In addition, the investigation team identified cases where radiological data was provided for areas not specific to the radiation work permit in use (e.g., the RWP for work in DMSA 13 contained surveys of all DMSAs, including DMSA 13). This caused the information provided to be ambiguous as to the location and confusing to workers and the radiological control technician.

  - Incomplete hazard information is sometimes used to develop RWPs. Although Bechtel Jacobs radiological control personnel stated that job hazard analyses or similar documents were utilized to develop RWPs for field use, cases were observed where RWPs were developed solely upon verbal information from the project supervisor. Bechtel Jacobs radiological control personnel attributed this issue to project pressures that did not always provide adequate time for health physics project planning. Consequently, radiological control personnel did not always have the benefit of, nor could they require, project supervisors to provide job planning or safety assessment documentation for RWP development.

  - Management initiatives for RWP compliance have not been totally effective. Bechtel Jacobs radiological control management recently issued a memorandum to all employees requiring verbatim compliance with RWPs. Although radiological control establishes radiation

protection requirements, enforcement of those requirements rests with project supervision to ensure worker compliance through appropriate oversight. However, the investigation team identified instances where RWP requirements were not followed, resulting in violations of the RWP requirements when the work was performed.

- Changes in RWP development processes were implemented without procedural guidance to personnel responsible for program implementation. Bechtel Jacobs developed an informal RWP special hazards assessment for use during RWP development that was piloted at PORTS; this was to be used to define and bound the possible radiological hazards associated with work requiring RWPs. The program was suspended by Bechtel Jacobs Health Physics following identification of concerns by the investigation team related to the lack of implementation guidance to the radiological control staff charged with RWP and special hazards assessment development.

- Deficiencies exist in the conduct and documentation of radiological surveys.

  - The accuracy of radiological survey data was questioned when contamination levels documented on a February 15, 2000, survey of X-705E were significantly lower than those documented in the most recent prior survey, although no area decontamination had been accomplished. Upon investigation, the investigation team determined that this survey was recreated from memory rather than from field notes. The investigation team further expressed concern that this survey will serve as guidance to subsequent entries into this area, and good conduct of radiological operations would lead to more reliable information about radiological status. The X-705E survey was subsequently removed from radiological control records.

  - The investigation team identified incomplete radiological surveys. For example, cases were observed where material release surveys did not include the required total contamination activity and a radiological control technician recreated surveys from memory without benefit of notes or other documentation. A radiological control technician indicated that surveys typically attributed high beta activity to technetium-99 without quantitative determination.

  - Radiological surveys often indicate numeric measurements below minimum detectable activity (MDA), critical detection level (L_c), or lower limit of detection (LLD) for the survey instruments in use, without the results being identified as such. Although the MDA for the instrument is noted on the form, the survey results may not reflect actual radiological conditions and may result in improper use of data.

- The use of thermoluminescent dosimeters is inconsistent with DOE requirements. Bechtel Jacobs permits individuals to work at different company-managed sites using their home site dosimetry, which is inconsistent with DOE exposure reporting requirements. In addition, USEC employees who perform work for DOE as WASTREN employees continue to wear USEC-issued dosimeters that are not accredited by the DOE Laboratory Accreditation Program. Although Bechtel Jacobs dosimetry personnel stated that individual radiation exposure information will be shared to permit DOE and USEC to satisfy their radiation exposure reporting requirements, no formal mechanism is in place to assure that these communications occur. Consequently, not all radiation exposure received during DOE activities is reported to DOE, and in reality, DOE exposure is actually reported to the NRC as if the exposure were received from NRC-controlled activities. Conversely, if the proposed practice of WASTREN transition workers supporting USEC on overtime while still on DOE dosimetry continues, internal or external exposures received from NRC-regulated activities could be attributed to DOE.

- DOE personnel did not comply with PORTS' dosimetry program. Before November 1999, the PORTS bioassay program consisted of submission of monthly spot urine samples. DOE Portsmouth Site Office personnel did not participate in the bioassay program, with the Site Office Manager's verbal approval. Even though DOE personnel were

unmonitored, they continued to enter areas that would have normally required bioassay program participation under the Bechtel Jacobs internal dosimetry program. After November 1999, DOE employees participating in the thermoluminescent dosimeter program were included in the quarterly 24-hour urinalysis collections.

Issue 12: The PORTS radiological air sampling program does not fully support the detection and evaluation of either the level or the concentration of airborne radioactive material at work locations.

Air Monitoring Station

The absence of approved procedures for air monitoring equipment calibration and the inadequate implementation of the air sampler calibration, sample analysis, and derived air concentration (DAC)-hour determinations prevent PORTS from fully implementing the radiological air sampling program.

- The investigation team observed the use of unapproved radiological control procedures for equipment calibration. Technical Specification 5.4.2, "Radiation Protection Program," requires radiation protection program procedures to be established, implemented and maintained as described in the SAR. The Scientific and Ecology Corporation subcontract statement of work authorizes Scientific and Ecology Corporation radiological control personnel (at PORTS) to utilize their procedures for radiological control equipment calibration. However, unapproved procedures from the former contractor, Lockheed Martin Utility Services, were in routine use for the calibration of various radiological control instrumentation, including breathing zone air sample pumps, high-volume and low-volume air samplers, some radiological survey equipment, and benchtop counting equipment.

- Radiological air monitoring program elements as required by 10 CFR 835 and the Bechtel Jacobs Corporate Radiological Control Operations Guide were implemented without sufficient technical basis. There is no technical basis documentation for the routine radiological air monitoring program at PORTS. DAC limits established for the radiological control air sampling program do not always reflect the most restrictive radionuclides that could be present. Although Scientific and Ecology Corporation/Bechtel Jacobs personnel stated that the most restrictive DAC is used for air sampling (neptunium-237), that requirement is not documented in Bechtel Jacobs procedures or guidance. In the only DAC-hour calculation conducted at the Plant within the last several months, the neptunium-237 DAC was not used to calculate DAC-hours for elevated counts discovered during analysis of a breathing zone filter.

- The investigation team noted that some radiological air sampling procedures were inadequate. Although PORTS was aware that sampling times for breathing zone air samplers were typically insufficient to collect an adequate air volume to determine representative radioactive airborne material concentrations, they did not take specific actions to correct this deficiency. The investigation team observed many cases where Bechtel Jacobs work activities lasted only 15 to 20 minutes, while breathing zone air samplers require a longer run time to collect a representative sample of airborne radioactive material. Inadequate run times preclude effective calculation of airborne radioactive material concentrations, directly impacting the site's ability to calculate potential personnel exposures to that material or to assess the effectiveness of respiratory protection devices used during the assigned work.

- Procedures and protocols have not been established to accomplish DAC-hour tracking for personnel exposures to airborne radioactive materials. Future implementation of that program would be impacted by the absence of radioisotopic characterization data and the lack of approved procedures for air sampler calibration, sample analysis, and DAC-hour data analysis.

- Scientific and Ecology Corporation radiological control management failed to take corrective action when program deficiencies were identified. When informed by radiological control personnel in October/November 1999 of problems associated with the calibration of air sampling equipment, Scientific and Ecology Corporation took no specific actions to correct the deficiency. In addition, radiological control personnel expressed concerns related to equipment operability and the inadequate volume of air collected during breathing zone air sampler use. Because these communications were internal to Scientific and Ecology Corporation (Portsmouth and Oak Ridge corporate), Bechtel Jacobs radiological control management was not aware of the concerns when they were identified by the investigation team.

Conclusion

Records indicate that the external doses to employees from the types of radiation present at PORTS are very low, and there have been no recent significant intakes of radioactive material. The PORTS radiation protection program exhibits excessive informality rather than a disciplined and rigorous application of controls, such as detailed RWPs, procedures, and air monitoring. Consequently, the Plant has increasingly relied upon both workers' and key persons' knowledge of and sensitivity to radiological hazards, particularly transuranics. Collectively, these issues are of concern because they represent potential programmatic weaknesses in the radiological protection program. Correcting these weaknesses will become more important as PORTS moves toward hazard characterization, the unique and challenging risks associated with future cleanup activities, and significant reliance on subcontractors, some of whom lack historical knowledge of Plant radiological hazards.

Management has not ensured that the level of discipline, rigor, and formality is sufficient to protect worker health and safety during hazardous material characterization and onsite cleanup activities. With regard to characterization of work areas, PORTS has not used isotopic characterization data developed by Lockheed Martin Utility Services in the early 1990s as a starting point for integrating data into the radiological control program. DOE and Bechtel Jacobs have not assumed sufficient responsibility for the oversight of subcontractor radiological safety and performance, including ensuring that those subcontractors are accountable for adhering to applicable DOE requirements.

3.4 Occupational Safety and Health

The occupational safety and health programs at PORTS reflect the continuing evolution of PORTS programs and the workforce from a single management and operating contractor to a limited management and integrating contractor responsible for oversight of an increasing number of Plant subcontractors. DOE maintains a site office of ten personnel, two of whom have direct safety and health oversight responsibility. Bechtel Jacobs has reduced staffing levels from 139 in April 1998 to a permanent staffing level of about 50. The eight-person Bechtel Jacobs safety and health staff consists of a manager; staff specialists in industrial hygiene, industrial safety, criticality safety, and radiation protection; and three environmental specialists. The Bechtel Jacobs industrial hygiene and safety staff is experienced in their safety disciplines, is knowledgeable of Plant facilities and hazards, and performs mentoring and oversight of Bechtel Jacobs subcontractors. WASTREN, Inc., the primary Bechtel Jacobs subcontractor, employs over three-quarters of the subcontracted workforce on site and is transitioning with respect to full implementation of safety and health programs. The two-person WASTREN safety and health staff is supported by a number of Scientific and Ecology Corporation radiation control technicians, an industrial hygiene technician, and several environmental support staff. While neither of the WASTREN safety staff has an extensive safety and health background, the project manager is an experienced safety manager.

Occupational health services for PORTS Federal employees and Bechtel Jacobs employees have been arranged though a subcontract with the Southern Ohio Medical Center (SOMC), located in Portsmouth, Ohio. SOMC is a full-service community medical center, and its occupational health clinic offers comprehensive occupational health services. The SOMC occupational medical staff have some familiarity with PORTS operations from past contracts with the USEC medical department; however, the physical location of SOMC (20 miles from the Plant) makes regular Plant visits impractical. The failure of Bechtel Jacobs to include key medical program requirements in the SOMC contract has resulted in weaknesses that could affect employee health. For example, medical personnel need to have continuous input concerning Plant hazards, should have knowledge of work activities that could generate health effects, and should actively participate with the worker protection team.

Bechtel Jacobs subcontractors are responsible for procuring their own medical service provider or may purchase medical services from SOMC. Some subcontractors have opted to retain the onsite medical services of the USEC medical department. Bechtel Jacobs has mandated that the PORTS subcontractors adhere to the medical requirements in DOE Order 440.1A, Chapter 19, "Occupational Medicine," as listed in Exhibit G of their subcontracts. Details of how these medical program requirements will be fulfilled are not well defined in either Exhibit G documentation or current subcontractor policy and procedures. For example, USEC and WASTREN have not yet reached agreement concerning how the USEC medical program staff will provide medical services according to Chapter 19 requirements. Also not defined is how the core USEC workforce will be provided medical surveillance under the subcontractor clause of DOE Order 440.1A. Site emergency medical services, including fire department emergency ambulance response and medical support, remain the responsibility of the USEC medical and fire departments. Bechtel Jacobs and WASTREN management have developed formal agreements with USEC concerning emergency response.

In the area of criticality safety, Bechtel Jacobs relies on a combination of engineered controls and administrative controls in the non-leased areas of PORTS. For waste drum handling, where fissile material loading is low, the controls are primarily administrative. Other Bechtel Jacobs-controlled areas with higher loading rely on administrative controls and engineered safety features, such as fixed position storage arrays that securely hold safe diameter containers with proper spacing. Interviews indicated that the Bechtel Jacobs criticality safety engineer and workers were experienced and knowledgeable. There is a good relationship with USEC, and the criticality safety evaluations that were reviewed were comprehensive. Procedures and postings, as well as engineered safety features for criticality safety based upon these evaluations, are generally well implemented. Containers of fissile material are generally well characterized, adequately controlled, and stored neatly. Because materials stored in DMSAs were identified and characterized, there were no criticality safety concerns with DMSAs that were documented and approved by DOE. There are also areas where DOE and USEC did not provide the required nuclear criticality safety review. Such areas include Buildings X-342 and X-343 (leased to USEC), where several cold traps were identified in 1999 as abandoned equipment that belonged to DOE. Additionally, an area in X-344A containing several UF_6 cylinders was identified as a DMSA established by USEC, without concurrence or approval of DOE pursuant to established agreements and procedures, and did not receive appropriate criticality reviews.

The issues in this section address weaknesses in the characterization of occupational safety and health hazards; an overall lack of effectiveness in a variety of occupational safety and health programs (e.g., hazard communication, ergonomics, confined spaces, air sampling for hazardous chemicals, occupational noise and hearing conservation, and bloodborne pathogens); and limitations in implementing occupational health requirements.

Issues

Issue 13. Occupational safety and health hazards are not adequately identified or analyzed prior to performing work, resulting in increased risk of injury and illness to workers.

X-7725 Waste Storage Area

- Hazards are not adequately identified in some hazard reviews included in both pre- and post-transitional work packages. For example, the hazard review for recent air handler preventive maintenance work in Building X-7725 did not identify or document either the confined space (non-permitted) hazard or the potential dust hazard. Furthermore, subcontractor workers recently entered non-permitted confined spaces (air handlers) without consideration or knowledge of a 1997 confined space hazard evaluation performed by Lockheed Martin. This evaluation required a reclassification of the normally non-permitted air handlers to a permitted confined space for certain

work activities, such as coil cleaning. The preventive maintenance job plan description (included in the work package) identified coil cleaning as a job task. However, the work package did not address the requirement to reclassify the work activity as a confined space entry during coil cleaning. Workers, work planners, and their supervision were not aware of these requirements, which could have resulted in entering a permitted confined space unknowingly and without appropriate permits and safety precautions. Because a number of subcontractor hazard evaluations were judged by Bechtel Jacobs to be inadequate, Bechtel Jacobs has taken compensatory measures to require safety personnel to participate in all hazard reviews.

- Neither pre- nor post-transitional work requests identified and documented all the hazards for some work activities, as previously discussed in Section 3.1.

- Chemical and toxic material hazards are not sufficiently characterized and documented for some work activities to ensure that the appropriate controls are in place to preclude worker exposures. Hazard identification and evaluation processes rely on workers' memory rather than a documented technical basis. For example, although waste material (e.g., soil in drums) has been characterized for its chemical constituents, this data was not used to develop a formal air sampling plan for workers involved in opening the drums in Building X-7725, other than through personal knowledge and experience. Although air monitoring is performed using direct reading instruments, personal air sampling for hazardous chemicals is not routinely performed when opening hazardous waste drums. Personal air sampling is required by 29 CFR 1910.120, Sections 8.2 and 8.4 of the Hazardous Waste Operations Health and Safety Plan for Building X-7725, and Exhibit G of the contract. During VOC sampling, key sampling parameters are not documented on the sample data form, the work procedure, the job hazard analysis, or elsewhere within the work package. Missing information includes the VOC(s) of reference (e.g., TCE), the action level, the actions required if the action level is exceeded (e.g., donning a respirator), and a reference to the specific waste stream.

- Exposure assessments are not routinely documented for noise, airborne chemical hazards, and ergonomic hazards as required by DOE Order 440.1A and Bechtel Jacobs procedures SH-A-5121, "Occupational Noise Exposure and Hearing Conservation Program," SH-A-5260, "Work Place Air Sampling," and SH-A-5133, "Ergonomics Program." Documented reevaluation of hazards is recommended in the DOE guidance document *DOE EH/EM Handbook for Occupational Health and Safety During Hazardous Waste Activities*, June 1996. Some hazards are not periodically reevaluated or adequately documented to reflect changes in facility conditions. For example, Bechtel Jacobs has not updated its baseline sound-level surveys since the Bechtel Jacobs contract began in April 1998. Some chemical inventories and MSDS books have not been maintained and do not reflect the existing chemical inventories, although recent improvements are evident.

- There are no established thresholds to involve industrial hygiene in identification or analysis of hazards before work is performed. This is evidenced in two recent work activities. On January 8, 2000, alumina material containing arsenic, cadmium, chromium, and lead was batched in L Cage. Elevated levels of airborne radioactive material were detected in the breathing zone of workers. Although there was also a potential for elevated levels of these airborne toxic metals in the breathing zone of workers, industrial hygiene was not contacted to evaluate the work activity or to sample or analyze for these hazardous materials. In a second example, a local DOE staff member identified that CDM, a Bechtel Jacobs subcontractor, failed to involve industrial hygiene in the evaluation and air flow rate testing of a fume hood in Building X-7725. The hood had been in use for a number of years to prepare environmental samples containing small quantities of nitric and hydrochloric acid, but hood flow rates had not been measured and recorded. A recent evaluation by industrial hygiene indicated that worker exposure did not exceed regulatory limits.

- MSDSs are not adequately managed or routinely referenced or evaluated to identify potential chemical hazards. For example, during waste operations, an absorbent material is routinely used when overpacking drums. When interviewed by the investigation team, Waste Operations supervisors were not familiar with the precaution in the MSDS not to use this absorbent when packing

materials containing hydrogen fluoride. Some waste material could contain hydrogen fluoride. Likewise, the job hazards analysis for this activity did not identify the incompatibility of this absorbent material with hydrogen fluoride. The failure to evaluate the hazards on an MSDS was a contributing factor in the recent sodium-potassium explosion at the Y-12 Plant in Oak Ridge, Tennessee. In another example, the subcontractor custodial staff does not routinely review MSDSs for cleaning agents, and the MSDSs are not adequately maintained or included in the Plant services work package for routine custodial work.

Issue 14. Effective safety programs have not been implemented in hazard communications, ergonomics, confined spaces, air sampling for hazardous chemicals, occupational noise and hearing conservation, bloodborne pathogens, and facility emergency response.

X-342A Feed Vaporization and Fluorine Generation Facility

- Line managers are not familiar with their line management responsibilities as defined in the procedures for these safety and health programs. For example, none of the subcontractor line managers or supervisors interviewed were familiar with the responsibilities assigned to line management in the hazard communication procedure, such as providing and documenting work area training in hazardous chemicals (which has not been conducted and/or documented). Another example is the occupational noise exposure and hearing conservation program procedure. Line managers were not aware of the requirement to ensure that workers exposed to excessive noise have a documented noise dose assessment and are included on the list of hearing conservation participants (in compliance with OSHA 1910.95).

- Safety and health procedures for these programs are deficient in several respects. Neither procedures nor subcontracts clearly distinguish between roles and responsibilities for Bechtel Jacobs and subcontractors for those safety and health programs that have responsibilities shared between the two organizations (e.g., hearing protection, confined space listing, chemical inventories, and local exhaust ventilation systems). For example, local ventilation exhaust lines in Building X-7725 are occasionally required for venting waste drums. The responsibility for testing and maintaining these exhaust lines (i.e., subcontractor or Bechtel Jacobs) is not documented. Some procedures do not adequately define the safety requirements (e.g., non-permitted confined spaces). Other procedures are not followed (e.g., hazard communication work area training).

- Some safety training required by OSHA and Plant procedures has not been performed or has not been effective. For example, work area specific hazard communication training as required by 29 CFR 1910.1200 and the WASTREN hazard communication procedure has not been conducted or documented. Also, workers previously trained in confined spaces were not familiar with the requirements for non-permitted confined spaces. One worker who performed maintenance in air handling units had not received confined space training, although he routinely works in non-permitted confined spaces. For some safety and health programs (e.g., bloodborne pathogens), the groups who could be exposed and therefore who need training (e.g., custodial workers) have yet to be determined.

- WASTREN is not in compliance with some of the requirements of Exhibit G of their contract for several of these safety programs. For example, personal air sampling in not being performed as required by Section 5.1.2 of Exhibit G., which requires a baseline evaluation using personal air samples for each task that has the potential for worker exposures. Personal samples from the worker's breathing zone are to be collected on at least 25 percent or two employees, whichever is

greater, using personal sampling pumps and the appropriate collection media. This activity has not been performed. In addition, elements of the subcontractor's site-specific hazard communication program are not implemented as specified in Section 5.4 of Exhibit G. Furthermore, the subcontractor's ES&H Plan does not address several of the site-specific provisions for emergency response as detailed in Section 3.4.9 of Exhibit G.

- Key supporting elements for some of these safety programs, which are required by DOE orders and/or OSHA, have not been developed at the subcontractor level. Examples of key program elements yet to be developed include a chemical purchasing, evaluating, and inventorying system; MSDS maintenance program; air sampling plans; emergency response plans; and bloodborne pathogen exposure control plans.

- Ergonomic programs at PORTS have not fully matured. Before March 2000, few work activities had been evaluated for ergonomic hazards, although a number of the recordable injuries since 1988 have been ergonomic-related injuries. The first cumulative trauma disorder for Bechtel Jacobs was recorded during the period of this evaluation. While some safety bulletins and pre-job briefings have stressed ergonomics, ergonomics is not incorporated in any formal training for workers, supervisors, or safety and health professionals. Supervisors are not provided instruction on identifying ergonomic hazards or using ergonomic equipment (which is provided to some supervisors). A 1994 DOE assessment identified ergonomic issues with drum handling. Based on field observations by the investigation team, recommendations from this assessment (e.g., two-person rule, use of a drum-handling tool) have not been implemented. During the period of the evaluation, however, Bechtel Jacobs has achieved significant progress in performing ergonomic evaluations and training. In addition, in recent weeks SOMC has been effectively integrated into the Bechtel Jacobs ergonomics program.

- Bechtel Jacobs facility emergency packets are deficient, outdated, and in some cases not compliant with OSHA emergency response programs. There are numerous deficiencies in the Bechtel Jacobs building emergency packets and pre-fire plan information, such as lack of required nuclear criticality safety and other reviews, inadequate chemical inventory and MSDS information, lack of specific building layout information, and outdated emergency contact lists. MSDS listings in the Building X-7725A and X-7725 facility emergency packets are not reflective of the wide diversity of chemicals stored within these buildings. The Bechtel Jacobs facility emergency packets procedure (BJC-SH-03) designates responsibilities for an Emergency Management Coordinator position that was eliminated two years ago. There are no facility emergency packets for the lithium storage warehouse (i.e., Buildings X-744N, P, Q, S, T, and U) as required by Bechtel Jacobs procedures and by OSHA regulation 29 CFR 1910.38. Facility emergency packets are not compliant with some elements of OSHA emergency response programs as described in 29 CFR 1910.38 and 29 CFR 1920.120. For example, the facility emergency packets for Buildings X-7725 and X-7725A, which also serve as the building fire prevention plans, do not meet the requirements of 29 CFR 1910.38, *Fire Prevention Plans,* with respect to training, maintenance requirements, and assignment of personnel responsibilities.

Issue 15. Bechtel Jacobs and its subcontractors do not effectively implement some occupational health requirements.

- The requirements of DOE Order 440.1A, *Worker Protection Management*, Chapter 19, "Occupational Medicine" or equivalent requirements have not been integrated into the DOE/Bechtel Jacobs work smart standards process. Several key requirements from this order have not been sufficiently addressed to provide the Site Occupational Medical Director with the information needed to develop a comprehensive occupational medical program. Elements not established include methods for identifying and communicating workplace hazards to medical professionals, comprehensive medical surveillance programs, performance of targeted examinations, and a method for communicating the results of those examinations to management responsible for mitigating those hazards.

- Clearly defined roles and responsibilities for Bechtel Jacobs and WASTREN line management, ES&H personnel, and emergency management to provide

information to the medical provider concerning hazards and health effects that could impact workers have not been established in site-specific documents. These requirements are necessary to ensure compliance with DOE Orders (e.g., 440.1A and 450.4) and should be clearly communicated through Plant safety and health policies and procedures.

- Although DOE Order 440.1A has been imposed by Bechtel Jacobs in the WASTREN subcontract, a formalized agreement that details how the medical program services will be provided has not been established.

- USEC employees who perform work for WASTREN at DOE facilities are not provided with medical program services in accordance with Chapter 19 of DOE Order 440.1A as required in Exhibit G of the WASTREN contract.

- Medical services for DOE Site Office Federal employees are not well defined in the Bechtel Jacobs subcontract with SOMC. Specific Federal regulations, requirements, and information concerning the Federal staff have not been communicated to the SOMC occupational medical clinic.

Conclusion

Since the Bechtel Jacobs contract began in April 1998, Bechtel Jacobs has achieved a recordable injury and illness rate of 1.65 per 200,000 work hours and a lost workday case rate of 0.55 per 200,000 work hours, both of which are well below DOE complex-wide averages. Current safety and health challenges for Bechtel Jacobs and their subcontractors are twofold. First, Bechtel Jacobs must further define and implement their emerging safety and health oversight roles and responsibilities. Second, Bechtel Jacobs subcontractors must implement health and safety programs commensurate with the hazards that their workers could encounter. Many of the subcontractor health and safety programs were adopted from existing Bechtel Jacobs programs. Bechtel Jacobs did not fully implement some of these safety and health programs before the transition to WASTREN. For Bechtel Jacobs, the challenge is to perform this safety and health oversight role with decreasing staff while concurrently mentoring new PORTS subcontractors, some having minimal safety and health experience and marginal knowledge of safety and health programs. The challenge for Bechtel Jacobs subcontractors (e.g., WASTREN) is to quickly develop and implement safety and health programs commensurate with the hazards encountered by their workers, while performing work safely. Bechtel Jacobs subcontractors have realized progress in adopting Bechtel Jacobs safety and health programs and in resolving some of the deficiencies identified during this evaluation (e.g., chemical inventories). However, significant program implementation (e.g., procedures and training) remains before an effective Plant safety and health program is in place. Specific safety and health areas requiring improvement, for Bechtel Jacobs and/or their subcontractors, are occupational health, hazard communication, confined spaces, lockout/tagout, occupational noise, air sampling programs, ergonomics, hazard identification and analysis, emergency preparedness, and safety and health procedures.