

**Office of Oversight  
Environment, Safety and Health**

*Evaluation of Authorization  
Basis Management Systems  
and Processes at the*

# Pantex Plant

August 2000



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# OVERSIGHT

# Executive Summary

<b>EVALUATION:</b>	Office of Oversight Follow-up Evaluation
<b>SITE:</b>	Pantex Plant
<b>DATES:</b>	March-June 2000

## Scope

The U.S. Department of Energy (DOE) Office of Oversight, within the Office of Environment, Safety and Health, performed a follow-up evaluation of the Pantex Plant. The follow-up evaluation focused on the authorization basis process – the hazard analysis and controls that are designed to ensure that facility operations and nuclear weapons operations are safe. An issue related to authorization basis was identified in the 1996 Office of Oversight safety management evaluation of the Pantex Plant. The Defense Nuclear Facilities Safety Board (DNFSB) also identified weaknesses in the Pantex Plant authorization basis process, resulting in DNFSB Recommendation 98-2 and a corresponding DOE implementation plan, which has recently been revised. The Oversight team analyzed the effectiveness of the authorization basis in terms of integrated safety management principles as they apply to the authorization basis process and products.

## Results

While much work remains, recent progress has been demonstrated under the leadership of the current Albuquerque Operations Office (AL) and Amarillo Area Office (AAO) management team. These efforts have resulted in some completed authorization basis documents, including the hazard analysis reports for several weapons programs, the lightning basis for interim operations, and site technical safety requirements. Within the

past two years, AL and AAO have worked with the contractor, Mason and Hanger Corporation (MHC), to establish many of the management systems, such as clear procedures and well-defined responsibilities, needed to support development of the authorization basis. Efforts to accelerate the identification and implementation of new hazard controls have led to safety improvements.

One of the key changes was to clarify and centralize responsibilities for the authorization basis by reassigning responsibilities to site management. MHC, with support from the national laboratories, now has responsibility for development of all authorization basis documents, and AAO is the approval authority. In the past, this responsibility was spread among various DOE and contractor organizations, resulting in conflicting direction, overlapping and poorly coordinated development efforts, inconsistent expectations for the scope of authorization basis documents, and multiple layers of reviews. These factors, in combination with other weaknesses (e.g., unrealistic schedules and lack of experienced authorization basis developers) that contributed to poor technical quality of submittals, hindered the development and approval of a comprehensive and integrated set of authorization basis documents.

To carry out this responsibility, AAO's technical capability has been strengthened, and plans are in place to address additional needs due to the recent assignment of the weapons program authorization basis to AAO. MHC has hired a technically capable manager for its authorization basis program and is providing technical expertise through subcontracts. However, the contractor's technical capability still does not match its increased responsibility for authorization basis document development; the ongoing efforts to enhance technical capabilities in this area are critical to success. In addition, efforts are under way to better align the national laboratories with their new responsibilities in support of the Pantex operating contractor in developing weapons programs authorization basis.

A clear vision for the Pantex Plant authorization basis has been established, and progress has been made in establishing standards and processes. During this Office of Oversight evaluation, a draft revised implementation plan for DNFSB Recommendation 98-2 was developed and is undergoing internal review before being submitted to the DNFSB. The revised implementation plan provides for a more strategic approach to authorization basis development. Many of the past problems resulted from the additional level of complexity associated with developing an authorization basis for nuclear explosives operations (i.e., the interfaces between the analysis and controls for specific weapons programs and the analysis and controls for facilities where work is conducted). The recently developed strategic approach involves development of a facility-specific authorization basis that incorporates the generic aspects of the analysis and controls for weapons programs, while the weapons-specific authorization basis identifies the analysis and controls that are specific to a weapon system. For example, the potential hazards associated with lightning and transportation, which are similar for various weapons systems, are addressed on a generic basis. This approach has the potential to improve efficiency in authorization basis development and maintenance, and increase consistency in implementation of controls in work activities.

In order to facilitate the development and maintenance of the Pantex Plant authorization basis, several standards and procedures have been promulgated since the 1996 review. The most recent authorization basis manual, which describes the site's authorization basis development processes, appropriately incorporated lessons learned from recent efforts. If properly implemented, this manual provides an adequate foundation for authorization basis development. The revision of the DNFSB Recommendation 98-2 implementation plan provides a clear vision and strategy for further authorization basis development. However, there is presently no approved implementation plan that describes in detail how the various authorization basis documents will be integrated into a comprehensive site safety analysis report. A commitment to develop such a plan is being included as part of a revision to the implementation plan for DNFSB recommendation 98-2.

Several other factors that hindered authorization basis development efforts have been fully or partially addressed since the 1996 review by recently completed or ongoing actions. AL has significantly increased its

use of contract mechanisms, such as award fee, to drive contractor authorization basis performance. The MHC General Manager recognized the need for, and established, appropriate personnel accountability mechanisms. The need for improvement in project management was recognized and efforts are ongoing. Actions are under way to correct deficiencies in the unreviewed safety question process, and additional actions are being evaluated to address weaknesses in implementation of this process that were identified during this Oversight evaluation.

The technical review of selected, recently developed authorization basis documents found few previously unrecognized problems. For example, the lightning basis for interim operations adequately encompasses protection of weapons from lightning. One of the problems recognized by Pantex line management is the need to upgrade the fire detection and alarm system, which currently lacks funding. The current fire protection system does not ensure timely and effective fire suppression for certain credible fire scenarios, and the current authorization basis does not comprehensively analyze fire scenarios. This current weakness is being addressed as part of a commitment to the DNFSB under the revised implementation plan. The Office of Oversight will monitor progress by the Pantex Plant in meeting this commitment to verify that the concern is fully and effectively addressed. In addition, the need to develop an authorization basis consistent with current requirements is highlighted by the current lack of fully developed analysis of leakage pathways for radioactive releases associated with a high-explosive detonation accident.

One new issue identified during this review requires corrective action and tracking in accordance with DOE policy. The issue involves several aspects of the authorization basis and unreviewed safety question program that do not meet DOE requirements related to change control.

Pantex production technicians expressed some concerns about the changes and increased controls associated with authorization basis implementation. Although the technicians were safety conscious and demonstrated rigor in implementing controls, their concerns indicated a lack of "buy-in" for the authorization basis process and resulting controls. While site management is aware of these concerns, additional dialogue between managers and technicians is warranted to facilitate the understanding of technicians' concerns, evaluate their input, and achieve their buy-in.

Before the current Office of Oversight evaluation, an Office of Defense Programs (DP) staff member disseminated a technical paper highlighting concerns with the Pantex Plant authorization basis processes and documents. The Office of Oversight did not specifically investigate those concerns. However, the AL Manager ordered an independent investigation of those concerns by an individual from outside of the Pantex Plant line management chain. This Office of Oversight report is not inconsistent with the results of that independent assessment.

## Conclusion


In the past two years, improvements in authorization basis activities have been made in the alignment of responsibilities, increased technical capabilities, and development of processes/standards. Recently developed authorization basis documents are thorough and exhibit few deficiencies. These efforts have improved safety through implementation of controls on the floor. However, much additional work is needed to address the 1996 Office of Oversight issue

related to authorization basis. Pantex Plant line management (AL, AAO, and MHC) has assessed past weaknesses, identified the need for further improvements, and initiated many actions. The current efforts, such as those in the revised implementation plan for DNFSB Recommendation 98-2 and actions taken in response to the Authorization Basis Task Force findings, are appropriate for addressing weaknesses in the authorization basis processes and products. However, some of the ongoing and planned initiatives are at an early stage of development or implementation, and their effectiveness has yet to be demonstrated. Continued management attention is needed to ensure that recent, ongoing, and planned initiatives are fully and effectively implemented and that they are verified to achieve their objectives. Particular attention is needed to address the deficiencies in the fire protection systems, increase MHC's technical capability, better define authorization basis end products, and achieve buy-in from production technicians. Management attention is also needed to develop corrective action plans for the issue identified during this evaluation (shown in the box below).

### ISSUES

**LEGACY ISSUE:** Lack of Fully Developed Authorization Basis Documents – MHC lacks fully developed authorization basis documents at Pantex, such as safety analysis reports (SARs) and technical safety requirement documents. Progress in updating SARs has been limited by ineffective monitoring by DP and AL of MHC work activities; inconsistent reviews by AAO, AL, and DP staff; and difficulties experienced by MHC in resolving technical issues.

**NEW ISSUE:** The current authorization basis documents and unreviewed safety question process do not support change controls in accordance with DOE Order 5480.21. Although upgrades are being made to the unreviewed safety question program and the authorization basis process and documents, the following areas are not fully addressed by the current programs or planned upgrades: (1) as implemented, the unreviewed safety question process does not always ensure that changes are reviewed for their potential impact on the safety basis, and (2) the hazard analysis reports do not reference some of the supporting analytical documents, and thus supporting information is not in the authorization basis or controlled.



**This Office of Oversight follow-up evaluation focused on authorization basis processes at the Pantex Plant.**

The U.S. Department of Energy (DOE) Office of Oversight, within the Office of Environment, Safety and Health, conducted an independent oversight follow-up review of the Pantex Plant from March through June 2000. The purpose of this evaluation is to follow up on an issue regarding the authorization basis process identified by the Office of Oversight during a 1996 safety management evaluation at the Pantex Plant. The specific issue as stated in the DOE Corrective Actions Tracking Systems is:

“Lack of Fully Developed Authorization Basis Documents – the Mason and Hanger Corporation (MHC) lacks fully developed authorization basis documents at Pantex, such as safety analysis reports (SARs) and technical safety requirement (TSR) documents. Progress in updating SARs has been limited by ineffective monitoring by DP and AL of MHC work activities, inconsistent reviews by AAO, AL, and DP staff, and difficulties experienced by MHC in resolving technical issues.”

As defined in DOE orders, the authorization basis is, “Those aspects of the facility design basis and operational requirements relied upon by DOE to authorize operation. These aspects are considered to be important to the safety of the facility operations. The authorization basis is described in documents such as the facility safety analysis report and other safety analysis: hazard classification documents, the technical safety requirements, DOE-issued safety evaluation reports, and facility-specific commitments made in order to comply with DOE orders or policies.” The authorization basis is an essential part of a safety management program because it identifies and analyzes hazards, identifies and establishes controls needed to ensure safety, and analyzes and

accepts residual risks associated with hazardous material operations.

It is important to recognize that the Pantex Plant currently has an approved authorization basis. However, the current authorization basis was developed, in part, with reliance on an expert-based approach, in which experienced technical and safety personnel determine that operations are sufficiently safe. DOE is transitioning to a standards-based approach in which decisions about the adequacy of safety practices are based on rigorous processes for systematically identifying hazards, detailed technical analysis, and clear standards.



**The Defense Nuclear Facilities Safety Board also identified weaknesses in the authorization basis for the Pantex Plant.**

In addition to the Office of Oversight legacy issue cited above, concerns regarding the authorization basis were identified in Defense Nuclear Facilities Safety Board (DNFSB) recommendations and letters. Most recently, DNFSB Recommendation 98-2, “Safety Management at the Pantex Plant,” which was issued and accepted by DOE in November 1998, addressed the need to accelerate safety improvements for nuclear operations at the Pantex Plant. The resultant implementation plan (approved in March 1999) included a set of commitments, many of which are under way or recently implemented. During the Office of Oversight review, the Pantex Plant revised the implementation plan for DNFSB Recommendation 98-2 to reflect changing milestones and new initiatives and is submitting the revision to the DNFSB.

This is the first Office of Oversight evaluation that focuses exclusively on the authorization basis process and products. The Office of Oversight recently expanded by adding staff members, including those with authorization basis expertise.

The intent is to use this increased capability to conduct more frequent reviews of authorization basis throughout the DOE complex. Authorization basis issues identified in past Oversight evaluations were considered in prioritizing the reviews of authorization basis at various DOE sites where problems have been noted. The Pantex Plant was selected for the initial review because of the slow progress reported in resolving the authorization basis issue identified during the 1996 Oversight evaluation.



**This Oversight evaluation is based on the guiding principles and core functions of the DOE integrated safety management policy.**

This follow-up evaluation is based on the DOE integrated safety management (ISM) system described in DOE Policy 450.4, *Integrated Safety Management*

*System.* That DOE policy describes functions that DOE deems necessary to fulfill its mandate under its enabling legislation to provide “reasonable assurance that the safety and health risk of operating personnel and the public be minimized.” In accordance with DOE Order 414.1A, *Quality Assurance*, Pantex line management must develop a formal corrective action plan to address issues identified in Office of Oversight appraisals.

Section 2 of this report includes an assessment of line management’s implementation of ISM guiding principles and the core function of performance feedback and continuous improvement at Pantex as they apply to the authorization basis analysis and resulting controls. Section 3 discusses opportunities for improvement. The legacy issue in this review that continues to require formal tracking and follow-up is summarized in Appendix A. Appendix B identifies the Office of Oversight personnel who participated in this evaluation.

## OVERVIEW OF THE PANTEX PLANT

**SITE:** The Pantex Plant is located on the plains of the Texas panhandle about 17 miles northeast of Amarillo, Texas. The site has more than 400 buildings situated on 16,000 acres of DOE land.


**MISSION:** The primary mission of the Pantex Plant is nuclear weapons stockpile stewardship. As part of this mission, the Pantex Plant performs various operations in support of nuclear weapons systems, such as assembly, disassembly, refurbishment, maintenance, modification, evaluation, interim storage of plutonium pits, fabrication of high explosives, and demilitarization/sanitization of components. The Pantex Plant also performs selected research and development efforts and has several ongoing environmental remediation projects.

**HAZARDS:** Potential hazards at the Pantex Plant include nuclear explosive hazards (e.g., a low-yield nuclear detonation resulting from an accident involving a nuclear weapons system), conventional explosive hazards (e.g., accidental explosions that could result in fatalities to workers), radiological hazards (e.g., exposure to plutonium, uranium, thorium, or tritium), and chemical hazards (e.g., exposure to acids, solvents, and limited quantities of other toxic materials, such as beryllium).

**SITE MANAGEMENT:** MHC manages the Pantex Plant, pursuant to a management and operating contract with DOE. MHC has managed the Pantex Plant since 1956. MHC has approximately 2,750 full-time equivalent personnel. AAO, a part of AL, administers the contract with MHC and oversees contractor operations at the site. About 90 DOE personnel are assigned to AAO. DP is the lead program secretarial office for AL and the cognizant secretarial office for the Pantex Plant. DP is part of the National Nuclear Security Administration, formed in March 2000.

The Office of Oversight focused on the seven ISM principles as they relate to the development, approval and maintenance of the authorization basis. Because of its importance to safety management and relevance to the authorization basis, one ISM core function, performance feedback and continuous improvement, was also reviewed.

**Guiding Principle #1 – Line Management Responsibility for Safety:** Organizations that have effective safety management programs place responsibility for safety with line management. Accordingly, line management must ensure that the safety management program includes safety policies and goals that are clearly articulated and communicated, and that workers are fully involved in safety issues and take appropriate action in the face of hazards encountered during normal and emergency conditions.



**Pantex Plant line management has historically made limited progress in developing a comprehensive authorization basis for the site.**

Pantex Plant line management – DP, AL, AAO, and MHC – is responsible for all aspects of safety management at Pantex, including the development of an authorization basis that fulfills DOE requirements and provides for the safety of the public, workers, and the environment. Until the past two years, the Pantex Plant's efforts to develop an authorization basis that meets DOE requirements have been slow. As noted in the 1996 Office of Oversight safety management evaluation, the Pantex Plant made limited progress in upgrading safety analysis reports (SARs) from 1992, when the requirements were issued, to 1996. Progress continued to be slow after the revised orders were issued in 1997; these revised orders included additional requirements for analysis of nuclear explosive operations. The continued slow progress contributed to the DNFSB decision to issue Recommendation 98-2, which addressed the need to accelerate safety improvements at the Pantex Plant.

Although the rate of progress has improved in the past two years, significant work remains before the Pantex Plant will have a set of safety analyses that meets current DOE requirements. According to most recent Pantex Plant projections, site and facility bases for interim operations (BIOs) and technical safety requirements (TSRs) will be developed by late 2002 and completion of the hazard analysis reports (HARs) and activity-based control documents (ABCDs) for nuclear explosive operations will extend until 2005. The nuclear explosive operations analyses (e.g., HARs and ABCDs for specific weapons systems operations), facility-specific analyses (e.g., BIOs and TSRs for the bays and cells at Pantex), and sitewide hazard analyses (e.g., generic lightning, fire protection, and seismic hazards) need to be integrated into a comprehensive SAR.



**Progress in some areas has resulted in safety improvements.**

Although overall progress has been slow, Pantex Plant line management has devoted significant resources to authorization basis efforts over the past eight years and has had success in some areas. Pantex has an approved sitewide BIO that provides for approval of current operations and that will be maintained until a SAR is developed and approved. MHC has completed SARs for some areas (e.g., special nuclear material storage) and a few sitewide hazard analyses, such as a BIO for lightning. MHC has also completed and implemented TSRs for certain operations that provide clear controls. MHC and the design laboratories – Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and Sandia National Laboratories (SNL) – under AL direction have completed HARs for five weapons systems, four of which have been approved by AL. Also, the Seamless Safety for the Twenty-First Century (SS-21) program has been successful where it has been applied (although only a few weapons systems have completed the SS-21 process). While much



work remains, the efforts to date have resulted in tangible safety benefits, such as greater rigor and formality in operations and enhancements to protection against electrical sources (e.g., surge protection and insulation/isolation devices).

During the past eight years, various factors have contributed to the slow progress in development of authorization basis documents (SARs, TSRs, and HARs). These have included the poor quality of some initial contractor products, changing requirements, changing organizational roles and personnel, and differing expectations among the various line managers and technical reviewers, particularly with respect to HARs. In addition, the completion schedule for HARs is linked to the comprehensive SS-21 process, which provides for a rigorous review and redesign of the entire nuclear explosive operation. The SS-21 process has been demonstrated to be effective in enhancing safety (e.g., it has redesigned processes to improve tools and eliminate potentially hazardous steps, such as hoisting, wherever possible). However, because of its detail and rigor, the SS-21 process is time-consuming and there are limitations on the design laboratories' ability to support it. Consequently, the SS-21 schedules extend to 2004.

**Progress has been hindered by various weaknesses in safety management systems.**

Weaknesses in the Pantex authorization basis processes and products have been documented in various reports, including the 1996 Office of Oversight safety management evaluation, various technical reviews by AL and DP (some of which used national



Aerial view of the Pantex Plant

laboratory personnel as technical reviewers), DNFSB recommendations and letters, various other independent reviews, and various internal DP assessments. The purpose of this Office of Oversight follow-up evaluation is not to revisit or reassess previously-identified weaknesses, and thus this report does not go into detail about specific past weaknesses. Rather, the purpose of this evaluation was to determine whether line management is effectively implementing its responsibility for safety, including taking corrective actions to address the issue identified in the 1996 Office of Oversight evaluation and related weaknesses in ISM.

For the purposes of this evaluation, some of the significant weaknesses in the historical safety management program that have been major contributors to the slow progress and technical deficiencies in the authorization basis can be summarized as follows:

- DOE and MHC standards and guidance have not been sufficient to provide clear expectations for effective flowdown, integration, and implementation of hazard controls at the facility and activity levels. In the absence of a clear definition of what is adequate (an “end point”), decisions about the adequacy of the products were largely left to the subjective and diverse opinions of a variety of reviewers. As a result, the review and approval process was extremely inefficient and involved multiple cycles of resolution of comments, many of which provided conflicting direction.
- DOE and MHC line management have not recognized the need to take a strategic and systematic approach to addressing implementation of the DOE orders (both the 1992 and 1997 series) and DNFSB recommendations related to authorization basis processes. Line management has not developed effective implementation plans for the DOE orders as required and thus missed an opportunity to establish a clear set of expectations. Similarly, the implementation plans for DNFSB recommendations (primarily 93-1 and 98-2) addressed individual elements in a parallel fashion, without a strategic approach that identified the end point and the interfaces between the various elements. Also, strategic planning was hindered by the deficiencies in clarity of policy and guidance.

- Roles, responsibilities, and authorities have not been well-defined, and accountability mechanisms have not been sufficient to facilitate the integration and implementation of facility and nuclear explosives authorization basis. Until recently, approval authority for site and facility authorization basis rested with DP, approval authority for HARs rested with AL, and MHC and the weapons design national laboratories each had responsibilities for various portions of the authorization basis development efforts. These fragmented responsibilities were not well-integrated or coordinated, contributing to overlapping and conflicting efforts.
- The DOE organizations did not have managers with the strong technical capabilities needed to provide effective technical direction and to approach decision-making from a risk management standpoint. Weaknesses in DOE technical capabilities have been a longstanding area for improvement and the subject of a related DNFSB recommendation (i.e., 93-3).
- Until the past two years, DOE line management has not devoted sufficient priority and attention to authorization basis development or ensured that the authorization basis is a fundamental part of mission requirements for program execution. At Pantex, as at many sites across the complex, the authorization basis analyses were performed by a support organization that did not have sufficient interface with the operational line program organizations. While significant resources were devoted to authorization basis efforts, resources were not always in line with expectations, or the analysts received insufficient support from operations and design agency personnel (e.g., LANL and LLNL have indicated that their funding constraints are such that they can support no more than two to three full SS-21 programs per year).



**In the past two years, DOE line management has been more proactive and has identified problems that need to be addressed.**

Within the past two years, DOE line management has become more proactive in addressing authorization basis weaknesses. DP, AL, and AAO have taken a

number of strategic steps that provide a framework for more effective implementation of safety management improvements at the Pantex Plant:

- Authorization basis development, review, and approval responsibility has been assigned to the personnel most familiar with the work (Pantex Plant contractor with AAO as the approval authority). This reassignment of responsibilities (which were previously divided among DP, AL, AAO, and design agencies) centralizes accountability for the authorization basis in a single individual (the AAO Manager) and facilitates coordination among the site/facility and HARs, which were previously under the direction of different organizational entities.
- Mechanisms, such as formal direction in manuals and project teams, have been established to improve the coordination of authorization basis activities among DOE, MHC, and the design agencies.
- Expectations have been clarified and accountability has been strengthened for contractor authorization basis activities through performance evaluation and measurement plans (which are used to determine award fees).
- Through the leadership of the AAO Authorization Basis Manager, the technical capability within the AAO organization has been significantly increased and long-range planning has been implemented to further strengthen its authorization basis capability, strengthen performance objectives and criteria for authorization basis activities, and ensure that needed authorization basis improvements are being addressed in the revised DNFSB Recommendation 98-2 implementation plan.
- Based on lessons learned, additional standards and guidance have been promulgated to clarify authorization basis expectations.
- The current request for proposal for the new contract emphasizes technical and business management capability. In addition, both positive and negative performance incentive clauses in the request for proposal (i.e., contract extension and termination clause provisions) are designed to

ensure that the successful bidder has strong incentives to meet DOE performance expectations.

These actions indicate that DOE line management has analyzed the past and current problems and is establishing a path forward. The initiatives include both short-term and longer-term actions (e.g., increasing technical capability and developing guidance documents) designed to address management system weaknesses that have previously hindered progress. The strategic approach in the revised implementation plan for DNFSB Recommendation 98-2 also indicates that DOE line management has assessed problems and identified needed improvements. To ensure compatibility with ISM, the revised plan is organized around DOE's five core functions of ISM.



**DOE line management is taking actions, such as ensuring that the contractor is accountable for effective performance.**

As part of the DOE line management conceptual approach, AAO has ensured that the Pantex contractor is and will be more accountable for performance (e.g., performance incentive clauses). As part of that approach, MHC was assigned more responsibilities, most notably the responsibility for HAR development, which had previously been a national laboratory function performed under the direction of AL. Initially, MHC was not fully prepared for these additional responsibilities and had difficulty meeting expectations, as discussed under Guiding Principle #4. More recently, MHC senior management has increased its attention to developing better strategies and project management techniques, and has taken a number of positive actions to address some of the barriers to improving the authorization basis. For example, the authorization basis functions were centralized and placed under the MHC Operations Director to strengthen line management accountability and ownership of authorization basis activities. The MHC General Manager also increased the visibility and leadership of the authorization basis function by establishing the position of Technical Advisor/Authorization Basis Program Director, who has brought leadership and focus to development of a path forward in achieving standards-based operations at the site (although the need to further strengthen in-house technical capability remains a recognized concern).



**Bunkers used for staging nuclear material**



**Some initiatives are in the early stages of development, and continued DOE line management attention is needed to ensure effective implementation.**

These DOE and MHC initiatives are important steps that were needed to facilitate the enhancement of authorization basis processes and standards-based operations at Pantex. However, some important initiatives are in the early stages of development or implementation, and their efficacy has not yet been demonstrated. There are several important areas where Pantex Plant line management (both DOE and contractor) needs to continue to focus attention:

- DOE and MHC line management have not yet adequately defined and communicated their endpoint expectations and strategy for authorization basis implementation at the site. While the revision to the DNFSB Recommendation 98-2 implementation plan provides a clear vision and strategy for further authorization basis development, there is presently no approved implementation plan that provides a detailed description of how the site SAR will be developed and implemented. A commitment to develop such a plan is being included in the revision to the implementation plan for DNFSB Recommendation 98-2.
- While senior management actions are positive and are strengthening the technical capability of both DOE and MHC, sustained, strong technical leadership is needed to drive organizational accountability for achieving an authorization basis that is fully compliant with DOE directives.

Although this has been recognized as an area of concern, MHC has not yet defined and developed its long-range strategy for addressing weaknesses in in-house technical capability for authorization basis development.

- Sustained and increased management attention is needed to ensure ownership and acceptance of authorization basis responsibilities at all levels of the MHC organization, particularly at the production technician and first line supervisory levels. The evolving authorization basis expectations, frequently changing requirements and controls, and increasingly diverse additional duties (e.g., verifying requirements related to fire loading before commencing assembly/disassembly work) currently contribute to a lack of understanding and acceptance by the workforce.

**Summary.** Pantex Plant line management has made limited progress toward developing an authorization basis that meets DOE requirements because of various factors, such as fragmented assignment of responsibilities. In the past two years, Pantex Plant line management has had success in some areas and has become more proactive in addressing authorization basis weaknesses. DP, AL, AAO, and MHC all have taken steps to improve implementation of safety management and authorization basis processes and products, including consolidation of line management responsibilities for authorization basis efforts and contractual provisions. While much work remains, the recent actions indicate that DOE and contractor line management have analyzed the past problems and are establishing a path forward. However, some of the important initiatives are in the early stages of development or implementation, and their efficacy has not yet been demonstrated. Pantex Plant line management needs to continue to focus attention on ongoing initiatives such as strategic planning, technical capabilities, project and resource management, and ownership and acceptance of authorization basis responsibilities.

**Guiding Principle #2 – Clear Roles, Responsibilities, and Authorities:** Organizations that have effective safety management programs place responsibility, authority, and accountability for safety with line managers. Accordingly, line management must ensure that the program includes well-defined roles, responsibilities, and processes for ensuring that management is accountable for safety performance.


A lack of clarity in roles, responsibilities, and authorities for authorization basis processes is a longstanding problem at the Pantex Plant. The 1996 Office of Oversight safety management evaluation of the Pantex Plant concluded that weaknesses were evident in defining and communicating roles among DP, AL, AAO, and MHC (particularly for SAR development) and holding DOE organizations and individuals accountable for safety-related performance. Other DOE and independent studies reached similar conclusions. The “120 Day Study,” which was conducted by independent reviewers (the Institute for Defense Analysis) for DP at the direction of Congress and issued in February 1997, discusses the overlapping and poorly defined roles and responsibilities within DP organizations, including the AL and AAO field elements. The April 12, 1999, DOE implementation plan for addressing DNFSB Recommendation 98-2 further underscored the need to clarify the roles and responsibilities of MHC personnel assigned to develop weapons process hazard analyses and associated controls and to further strengthen MHC line management accountability for safety of weapons processes. A 1998 Phase I and II ISM system verification report for the Pantex Plant also confirmed the need to establish a clear understanding of the respective roles and responsibilities of DOE, the national laboratories, and the Pantex contractor. A May 1999 Authorization Basis Task Force (ABTF) was convened by MHC to address the continuing authorization basis problems at the Pantex Plant. The ABTF report also identified the need to establish clearly defined roles and responsibilities among all the parties participating on weapons project teams that are responsible for or support authorization basis development and implementation.

**Approval authority for all nuclear explosive facility and process authorization basis documents is now vested with the AAO Manager.**

Over the past five years, DOE has implemented a strategy of selectively delegating responsibilities and authorities to its field organizations. In May 1999, the Assistant Secretary for Defense Programs delegated approval authority for authorization basis documents to the AL Manager for nuclear explosive facility operations, who then redelegate that approval authority to the AAO Manager. In March 2000, the

AL Manager delegated approval authority for authorization basis documents for nuclear explosive processes to the AAO Manager. With this most recent delegation, approval authority for nuclear explosive facility and process authorization basis documents is now vested with the AAO Manager, who is the DOE line manager closest to where the work is performed.

Responsibility for developing HARs and operational controls was recently assigned to MHC (HARs had been performed by the national laboratory that developed the weapons system), along with the responsibility for leading the various weapons project teams and developing the associated weapons project plans. Recently, MHC realigned its authorization basis organization within the Operations Directorate, appointed an Authorization Basis Program Director/Technical Advisor who reports directly to the MHC General Manager, and realigned the weapons program management function.


 **The realignment of responsibilities can improve the development and approval of authorization basis documents.**

With these changes, the responsibility for authorization basis documents and nuclear explosives operations is now clearly vested in AAO and MHC organizations. MHC is responsible for the safety of operations and development of authorization basis documents. AAO is the DOE entity directly responsible for approving operations based on an analysis of the adequacy of safety measures and controls. The national laboratories support these efforts by conducting evaluations of weapons response to accident stimuli and other analytical efforts. Although challenges remain, this realignment of responsibilities in the past year has the potential to improve the efficiency of authorization basis document development, review, and approval. As a result of the changes, DOE line management responsibility for authorization basis has been aligned to strengthen the flow of line management responsibility from DP to AAO. The delegation of authorization basis approval authority to AAO provides for single-point accountability and consolidation of responsibilities. These changes also establish a framework for formally defining AAO responsibilities and authorities for important interfaces among the various organizations, including integrating facility and weapon authorization

basis activities within the Authorization Basis Manager's office, managing the change control process, and integrating facility and weapons review team activities (see Figure 1).

To provide the AAO with additional authority and resources to match its new responsibilities, the AL Safety Analysis and Support Division was recently eliminated, and the responsibility for managing the Safety Basis Review Team (SBRT) process was transferred from the Safety Analysis and Support Division to AAO. As a result of this organizational realignment and other personnel changes, three full-time equivalent positions were established in AAO to support the new SBRT role and other authorization basis-related functions.

Recognizing that the previous lack of clear roles and responsibilities has been a problem, AL and AAO have taken several steps to enhance the clarity of the roles and responsibilities related to the authorization basis. For example, AL revised the Development and Production (D&P) Manual to better define the roles and responsibilities for implementing the SS-21 processes and other planning and coordination functions. AL and AAO also tasked MHC and the national laboratories to define their respective roles and responsibilities and expectations for evaluating weapons response for inclusion in the D&P Manual.

 **AAO has taken steps to hold the contractor accountable for its authorization basis performance.**

AAO has also taken steps to ensure that MHC is held accountable for its authorization basis performance. In its recent evaluation, AAO effectively used the award fee process to hold MHC accountable for authorization basis-related performance. Performance measures are tied to the Integrated Weapons Activity Plan (IWAP) and Performance Evaluation and Measurement Plan expectations and commitments. Given the already well-defined and mature expectations in the current Performance Evaluation and Measurement Plan, AAO is well-positioned to provide direction to the contractor and ensure accountability for performance. In addition, strong accountability mechanisms have been included in the request for proposal for the ongoing contract solicitation process. As one important example, the contractual accountability mechanisms in the request for proposal provide DOE senior management with a

	Organizational Roles and Responsibilities	Site and Facility Authorization Basis Documents (e.g., SAR, BIO)	Weapon-Specific Authorization Basis Documents (e.g., HAR)
1996	Development	MHC	Labs
	Review	AAO, AL, DP, with support from labs	MHC, AAO, AL, DP
	Approval Authority	DP	AL
2000	Development	MHC	MHC with support from labs
	Review	AAO	AAO
	Approval Authority	AAO	AAO
Streamlining and Enhancements	<ul style="list-style-type: none"> <li>• A single organization now has responsibility for development, and facilitating coordination and accountability.</li> <li>• AAO has sole responsibility, authority, and accountability for review and approval, although other organizations perform selected functions, such as readiness reviews, and other organizations support AAO reviews.</li> <li>• The approach streamlines the process, focuses responsibility at the site, and facilitates integration and interfaces.</li> <li>• Challenges remain in ensuring accountability for effective support of MHC by the labs, including DP/Oakland Operations Office and LLNL, as well as effective support of AAO by AL and DP.</li> </ul>		
AAO	Amarillo Area Office	HAR	Hazard Analysis Report
AL	Albuquerque Operations Office	LLNL	Lawrence Livermore National Laboratory
BIO	Basis for Interim Operation	MHC	Mason and Hanger Corporation
DP	Office of Defense Programs	SAR	Safety Analysis Report

**Figure 1. Streamlined Responsibilities for Pantex Authorization Basis Development**

means to terminate the contract based on poor performance.

Recognizing the need to improve overall organizational effectiveness, MHC has taken positive steps to define and clarify roles, responsibilities, authorities, and accountability for authorization basis-related activities. MHC STD-2537, “Performance Appraisal,” defines the process for conducting individual performance appraisals. This mechanism strengthens MHC organizational and individual accountability by assigning Performance Evaluation and Measurement Plan performance measures and expectations for managers and incorporating them in their personal performance plans. The performance

plans for MHC managers (i.e., Operations Director to first line supervisor) reflect specific Performance Evaluation and Measurement Plan measures, IWAP commitments, and strategic plan objectives. Thus, the individual performance plans link contract performance to DOE expectations and hold individuals accountable for performance. In addition, MHC STD-7012, “Functions of Weapons Program Managers,” allows weapons program managers to have input to the performance evaluations of project team members, thus providing a level of accountability for individual performance in support of authorization basis development and weapons projects.

**The contractor has taken steps to clarify and institutionalize roles, responsibilities, authorities, and accountability for authorization basis-related activities.**

MHC has developed a policy directive, “Roles and Responsibilities for the Management and Operation of the Pantex Plant,” that is incorporated into the Management, Integration, and Controls (MIC) ISM Description Document. This policy directive defines roles and responsibilities at the highest level. Flowing down from this top-level document, Directorate-level standards provide more specific descriptions of organizational roles and responsibilities. STD-7403, “Operations Directorate,” defines roles and responsibilities for all levels of the organization down to the first line supervisory (Operations Manager) level. This is the primary driver that now defines the roles, responsibilities, and interfaces with support organizations, such as the Program Management Directorate (STD-7012, “Functions of Weapon Program Managers” and STD-7401, “Weapons Program Project Team”). This approach is effective in moving the site toward an integrated set of roles and responsibilities. These roles and responsibilities have been well-communicated, as evidenced by a good understanding of roles by most individuals interviewed throughout the Program Management and Operations organizations.

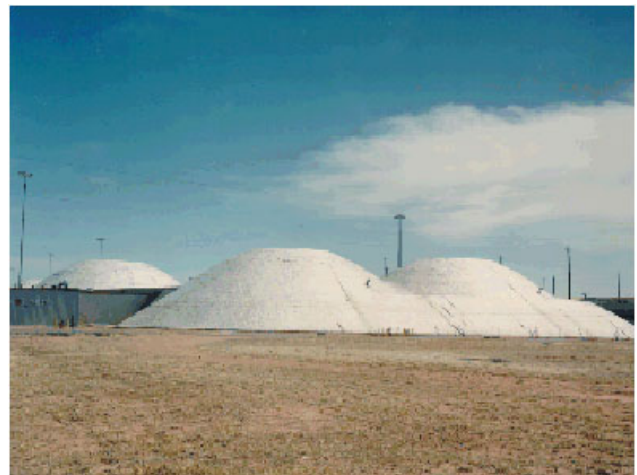
While these changes represent a significant improvement in defining the roles, responsibilities, authorities, and accountabilities for DOE, MHC, and the national laboratories, several areas remain that need to be addressed. As discussed below, additional improvements in roles, responsibilities, and accountability are needed to strengthen the new management framework and facilitate the timely development and implementation of authorization basis documents.

**DOE line management needs to take additional measures to hold the national laboratories accountable for authorization basis-related commitments.**

DP and AL, in coordination with the Oakland Operations Office (which has responsibility for LLNL), need to take positive measures to hold the

national laboratories accountable for authorization basis-related commitments in support of MHC authorization basis development and implementation. Some steps are now being taken to hold the laboratories accountable for supporting MHC project teams and authorization basis development. Although the Standing Management Team (SMT) now provides the forum for identifying institutional commitments from its DOE, MHC, and national laboratory members, including the use of a commitment tracking matrix, there is no formal mechanism in place to ensure that the laboratories meet commitments in a timely manner. The D&P Manual has been incorporated into the SNL and LANL contracts as a first step in using the D&P Manual to define roles and responsibilities for support of the IWAP and associated authorization basis activities at Pantex. AL, along with other operations offices, are participating in a DOE Headquarters initiative aimed at using contract mechanisms to provide incentives to the national laboratories through performance measures. Although these are positive steps, AAO has responsibility for the overall authorization basis effort but little direct control or authority over national laboratories, which are directed and evaluated by other AL area offices and the Oakland Operations Office. Thus, increased DP and AL management attention, as well as increased interface with Oakland Operations Office, is needed to ensure effective and timely national laboratory support.

The formal mechanisms for documenting roles, responsibilities, and authorities within the DOE line organization do not reflect current authorization basis organizational assignments. The DP Functions, Responsibilities, and Authorities Manual needs to be revised to reflect the recent strategic National Nuclear Security Agency realignment and to define DP line



Pantex facilities used for Explosive Operations

management responsibility for support of authorization basis review at Pantex. The current AL Functions, Responsibilities, and Authorities Manual does not yet reflect the evolving National Nuclear Security Agency/AL relationship and the current authorization basis approval authorities recently delegated to AAO. An initiative is under way within AL to update the AL Manual as part of the ISM development effort, with completion expected by the end of FY 2000. In addition, the AAO Functions, Responsibilities, and Authorities Manual, Procedure 103.4.0, has not yet been revised to reflect the recently delegated approval authority for nuclear explosives operations authorization basis documents or the recent transfer of authorization basis responsibilities.


Although DOE line managers feel a strong sense of ownership and accountability for their authorization basis-related performance, formal mechanisms are not in place that link an individual's performance expectations to the organization's mission and objectives. As part of the AL performance appraisal process, AL policy allows AAO staff to continue to use the "360 degree" pass/fail performance appraisal process, which does not establish specific performance expectations and is not consistent with DOE Order 331.1A, *Employee Performance Management Systems*.



**Additional clarification of contractor roles and responsibilities is needed in certain areas.**

Although the framework and mechanisms for flowdown of roles and responsibilities throughout the MHC organization are in place, additional clarification of roles is needed in certain areas. An April 2000 Phase I ISM verification at Pantex identified the need to further define roles and responsibilities within the Program Management Directorate and to clarify the hierarchy of documents. For example, in the functional area of training there are a number of standards but no clear hierarchy of documents, even though some are subordinate to others. Also, the "Pantex Plant Integrated Safety Management (ISM) Authorization Basis Manual," MNL-254543, which provides guidance for all authorization basis documents, including generic roles and responsibilities for organizations and individuals, needs to be updated to reflect the role of Operations in the development and implementation of authorization basis documents and controls.

In addition, emphasis must be maintained on the horizontal integration of roles and responsibilities. MHC is aware of the need for an institutionalized process that includes reviewing newly created or revised standards or lower-tier procedures to ensure that they reflect a current and consistent set of roles and responsibilities for those individuals and organizations involved in weapons projects and related support activities. MHC has begun reviewing standards, such as those for the development, revision, change control, and approval of authorization basis documents (STDs-3071, 3073, and 3075), on a case-by-case basis.



**AL is revising the role of the Nuclear Explosives Safety Study Group to provide an additional independent review.**

AL is revising the scope of responsibilities of the Nuclear Explosive Safety Study Group (NESSG), which conducts the nuclear explosive safety study that evaluates nuclear explosive operations against the Nuclear Explosive Safety Standards (e.g., DOE Order 452.2A, *Safety of Nuclear Explosive Operations*). Up until the present, the NESSG had directed that certain controls be implemented for weapons activities without providing any technical basis. The future role that NESSG plays in the authorization basis process for the nuclear explosive operations is delineated in the revised implementation plan for DNFSB Recommendation 98-2, which eliminates NESSG from directing what controls should be implemented and provides for an additional independent review, including a review of the adequacy of the MHC-proposed controls. The future role of the NESSG also includes making recommendations for the authorizing official to approve the nuclear explosive operation, usually in the same time frame as the DOE readiness review team. DOE had a defined expectation that the NESSG would have a high level of technical expertise and include representation of the interested parties; the core NESSG is to include a Federal chairman from AL or the Nevada Operations Office, members from each of the design laboratories (SNL, LANL, and LLNL), and two emeritus members. For the studies at the Pantex Plant, the operating contractor will also have a member on the NESSG. AL, AAO, and MHC senior and program managers and the Pantex nuclear explosives safety member are in agreement that the



future role of NESSG as an independent review is appropriate and an improvement over NESSG's past role as the primary basis for determining the adequacy of safety. The D&P Manual also has been updated to include the revised roles and responsibilities of the NESSG.

**Summary.** DP, AL, AAO, and MHC have taken significant actions in the past year to address a longstanding weakness in the definition of roles, responsibilities, and authorities for authorization basis processes. Recent changes have focused the responsibility for nuclear explosive operations in AAO and MHC. This realignment of responsibilities can improve the efficiency of authorization basis document development, review, and approval. AAO has been given additional authority and resources to meet its new responsibilities. AL and AAO have taken several strategic steps to clarify roles and responsibilities related to authorization basis, such as the issuing the D&P Manual. In addition, AAO has taken steps to ensure that MHC is held accountable for its authorization basis performance. Similarly, MHC has taken steps to improve overall organizational effectiveness, such as strengthening performance measures and expectations for managers and incorporating them in their personal performance plans. Notwithstanding these significant improvements, additional improvements in roles, responsibilities, and accountability are needed in certain areas, such as positive measures to hold the national laboratories accountable for authorization basis-related commitments, updating of key documents to reflect the revised responsibilities, strengthening formal performance evaluation mechanisms for DOE personnel, further clarification of certain MHC roles, and additional emphasis on the integration of roles and responsibilities.

**Guiding Principle #3 – Competence Commensurate with Responsibility:** A fully functioning safety management system has workers and managers who are technically competent to perform their jobs and who are appropriately educated and knowledgeable of the hazards associated with site operations. Management must assure that effective training programs are in place and that sufficient qualified staff are available. Workers must have technical capability to respond to workplace hazards.

**DOE.** While authorization basis responsibilities have been delegated to AAO, AL performs some readiness reviews of weapons and facility operations, which are part of the process for verification of controls. The AL readiness review activities are managed by the AL Independent Safety Review

Division, which relies on three technical managers to lead readiness review teams. While these individuals are experienced in conducting readiness reviews, AL has not defined minimum requirements (e.g., education, experience, and training) for personnel who lead or participate on teams evaluating readiness of Pantex weapons activities. AL has initiated a corrective action that includes updating AL SD 425.1A, which is the implementing directive for DOE Order 425.1A, *Startup and Restart of DOE Nuclear Facilities*. Requirements will be added to address minimum training and qualification, including a condition that team leaders must have previously served as a deputy team leader on at least one readiness review. The AL supplemental directive is targeted for the end of FY 2000. In addition, AL plans to use an experienced senior-level technical specialist as an advisor on upcoming reviews for the W-76 and W-88 to further strengthen the depth and breadth of readiness reviews.




**AAO has enhanced authorization basis staffing and qualifications to meet its increased responsibilities.**

**AAO.** AAO has taken positive steps to enhance authorization basis staffing and qualifications to meet their increased responsibilities as the authorization basis approval authority for Pantex. AAO hired staff with extensive backgrounds in authorization basis and has taken interim measures, such as supplementing current staffing levels with AL and DP-45 expertise. A memorandum of understanding between AAO and AL ensures availability of AL staff needed to support safety evaluation reports (SERs). Currently, the authorization basis organization has five full-time staff, two of whom were hired within the past year. AAO has performed a staffing analysis specific to current and future weapons systems and facility SER activities, which concluded that at least three additional technical staff were needed to participate in SERs for upcoming facility and weapons activities. AL has authorized AAO to upgrade several authorization basis positions to “excepted service level” and recently established three engineering slots within AAO.

AAO has also improved its authorization basis qualification standard to meet additional safety analyst qualifications contained in AL's program. The AAO qualification standard is comprehensive and specifies required education, knowledge, and skills for

authorization basis personnel. However, the standard relies on individual initiative, rather than formal training, to complete qualifications. Various factors limit individuals' ability to participate in a formal training program; there is limited funding for travel and training, and the AAO training organization consists of one Federal employee on a collateral duty basis.


 **Many AAO staff have not completed the recent formal qualification standard.**

The Authorization Basis Manager, many of his staff, and most AL staff who support AAO have completed previously-established qualification standards but are not yet qualified under the AAO qualification standard issued in September 1999. The AAO Authorization Basis Manager has not established formal goals, such as completion dates for qualification under the new standards, for the staff. AL personnel have not completed AL qualification requirements, and it is not clear whether they will be required to do so because requirements were promulgated by the Safety Analysis and Support Division, which was eliminated shortly after the AL safety analyst qualification standard was created. Although few authorization basis personnel have completed the new formal qualification requirements, AL and AAO have a system for tracking and reporting individual training records, so they are cognizant of the status of qualification.

**MHC.** Management and technical staff weaknesses in authorization basis development and establishment of controls are a recognized problem at the Pantex Plant. Various reviews, such as the ABTF review, identified needed improvements in the ability to develop authorization basis documents and ensure adequate in-house expertise (rather than relying on subcontractors). Weaknesses in the technical staff's ability to develop authorization basis documents and associated controls effectively and efficiently contributed to deficiencies in authorization basis submittals to DOE and the slow progress in authorization basis development.

MHC has recently hired an experienced and qualified manager for the Authorization Basis Development and Management Group. The Group Manager has made an attempt to improve current staffing levels. Within the past year, nine authorization basis personnel have been hired, including the manager for the facility/site authorization basis department.

Authorization basis training has been provided to all authorization basis personnel.

 **The ability of the contractor technical staff to develop authorization basis documents and associated controls effectively and efficiently is still a weakness.**

Although strengthened by recent actions, weaknesses in staffing persist. Many of the staff lack extensive experience in facility and nuclear safety, particularly in establishing and maintaining facility safety controls. Seven of the 34 technical managers and staff within the Authorization Basis Development and Management Group (more than 20 percent) have one year or less direct experience in development or review of facility authorization basis documents. Sixteen have three years or less of direct weapons or facility authorization basis experience at Pantex. Formal staffing goals and needs, including a documented plan for obtaining experienced and qualified authorization basis personnel, have not been prepared. Also, the ABTF identified a lack of qualification standards for authorization basis/safety basis job functions. This finding has not yet been formally addressed.

Although actions have been taken to enhance staff capabilities, additional attention is needed to ensure adequate depth in technical leadership. The recently hired Authorization Basis Development and Management Group Manager is well-qualified and experienced, but is currently performing in several roles, including managing the authorization basis development efforts, conducting technical review, developing programs (e.g., unreviewed safety questions [USQ] program upgrades), and providing technical support to the MHC General Manager (e.g., quality review of documents before submittal to DOE). In addition to the difficulty in concurrently performing these important functions, some of these functions should have a degree of independence that cannot be achieved if performed by a single individual. For example, quality review of authorization basis documents is better performed by individuals who are not involved in managing their development. MHC needs to consider ways to develop or obtain additional technical leaders to manage the diverse functions associated with authorization basis development and implementation of controls.

**As an interim measure, the contractor is using subcontractors to provide safety analysis services and mentor contractor staff.**

To compensate for current shortages of experienced personnel, MHC is using support contractors who have experience in authorization basis efforts to provide safety analysis services and mentor existing MHC staff. Although this is an appropriate interim measure, MHC needs to continue to focus on enhancing in-house capabilities so that it can perform effectively without relying on subcontractors for technical expertise.

MHC uses a systematic approach to determine authorization basis training needs for personnel performing and supporting weapons activities. Training coordinators work directly with production managers and authorization basis personnel to determine required training and qualifications for the entire production team, including managers and project team members. Training program descriptions are developed for each job function and prepared through tabletop analysis that considers specifics of the weapons system and hazards. This process is addressed in plant standards that prescribe training requirements for Pantex, including MHC standard STD-2533, which implements DOE Order 5480.20A, *Personnel Selection, Qualification and Training Requirements for DOE Nuclear Facilities*.

**Recent training and other initiatives have significantly improved Pantex personnel's awareness and knowledge of Pantex authorization basis requirements and activities.**

Awareness and knowledge of Pantex authorization basis requirements and activities among MHC personnel has been significantly improved by recent revisions of plant standards and procedures, reorganization of personnel into weapons and facility authorization basis development functions, and newly developed authorization basis training. Authorization basis training is now given to program managers, authorization basis personnel, production technicians, and the general plant population. Authorization basis training addresses both weapons and facility authorization basis documents. The current authorization basis training includes courses on

authorization basis, facility safety, USQ processes, and controls. For example, Pantex provides a three-day qualification course for personnel conducting USQ evaluations.

Authorization basis training courses are being updated to incorporate training on the Master Authorization Agreement and the MHC Authorization Basis Implementation Manual. Also, a one-day training course is under development on how to perform a USQ pre-screening process. This training will target a broad audience (100-300 people) and is scheduled for a pilot implementation at the end of May 2000.

**Pantex training programs are generally effective.**

Based on a sample of authorization basis training course materials, Pantex training programs provide complete and accurate coverage of authorization basis topics. In particular, the course on Authorization Basis and Implementation of Controls was found to be effective in raising awareness among the entire plant population. This training provides a basic definition of authorization basis and how it is integrated with the Pantex ISM system, and it specifically addresses flowdown of authorization basis controls to shop-floor documents and how various job functions relate to the authorization basis.

MHC has a management system in place to ensure that training status is systematically tracked and reported to supervisors. The Training Records and Certification system tracks training requirements and status for each MHC employee. The system is



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reviewed daily and if an employee has not satisfied the training requirements for a weapons-sensitive job function, his/her access to a controlled area is automatically denied.

**Summary.** To complement the capabilities of its own staff, AL plans to use an experienced senior-level technical advisor on future readiness review teams. AL has not defined minimum requirements for personnel who participate in readiness reviews, although corrective actions are in progress. AAO has enhanced authorization basis staffing and qualifications to meet its increased responsibilities. AAO has also improved its authorization basis qualification standard to meet the additional qualifications for safety analysts contained in AL's program. Formal training should be provided to AAO staff on an individual-need basis.

Under the direction of a well-qualified, recently hired authorization basis manager, MHC has enhanced its staffing and capability to carry out authorization basis responsibilities through new hires, contractor support, and additional training. However, there are still shortages in technical leadership and experienced authorization basis staff, and qualification standards are not yet in place. Additional management attention is needed to add or develop technical leaders and ensure adequate in-house technical capability to perform authorization basis activities.

MHC has a systematic approach to determine authorization basis training needs and an effective training program. MHC personnel awareness and knowledge of Pantex authorization basis requirements and activities have been significantly improved by recent revisions of plant standards and procedures, reorganization of personnel into weapons and facility authorization basis development functions, and newly developed authorization basis training.

**Guiding Principle #4 – Balanced Priorities:** A well-performing organization has a management system that identifies, analyzes, and prioritizes risks posed by the hazards inherent in the work to be performed. The system must also establish priorities to mitigate those risks. The priorities are used to request, allocate, and apply resources to meet safety goals, program goals and objectives, and operational needs.

DOE's policy requires that nuclear explosive operations be developed and conducted with safety as a primary consideration. To meet this objective with limited resources (including budget, personnel, and facilities), the Pantex Plant developed and executed improved work planning processes for integration of

nuclear weapons systems operations and authorization basis activities. As discussed under Guiding Principles #1 and #2, DOE has taken a number of steps over the past four years, including the development and implementation of ISM and realignment of roles and responsibilities, to provide a framework for more effective implementation of safety management improvements at the site. AL and AAO also recognized a need to improve planning guidance and coordination mechanisms. Much of this guidance is now contained within the AL Development and Production Manual, which provides a framework for identifying key milestones, associated performance expectations, and change control processes for project planning and management review.



**Pantex has developed a strategic planning document that outlines the scope of work at Pantex.**

The scope of work for Pantex weapons systems operations, including associated hazard analyses and facility authorization basis upgrades, is defined through the IWAP, a high-level strategic planning document. The IWAP includes project plans for individual weapons systems and facility authorization basis projects, detailing the specific scope expectations and priorities, including the authorization basis requirements; costs to do the required work; and schedules for all activities. The SMT, composed of line and program managers from AL, AAO, the Pantex Plant contractor, and the design agencies, oversees development and execution of the IWAP. Although still evolving, the primary objectives of the SMT are to facilitate the coordination and review of proposed projects, and to obtain the necessary commitments from participating organizations to ensure that resources are made available to support IWAP project plans and schedules.

In the past, weapons systems expiration dates from Nuclear Explosives Safety Studies (NESS) were a major factor in setting priorities for weapons systems work. Recognizing that the expiration dates did not necessarily correspond to risks, Pantex Plant line management has revised processes so that weapon activity priorities are now more based on risks. Their current higher priorities include activities involving the conventional high explosive weapons systems activities (which are inherently more hazardous than

systems that use insensitive high explosives) and the identification of generic engineering controls for addressing site and facility hazards applicable to multiple weapons systems, such as lightning, fire protection, and transportation hazards.

**AAO has increased attention to ensuring that the contractor improves the timeliness and quality of authorization basis submittals.**

Since the realignment and consolidation of authorization basis responsibilities for facility and weapons program activities at the Pantex Plant, AAO has significantly increased priority and attention on ensuring that the Pantex Plant contractor improves the timeliness and quality of authorization basis submittals and their implementation. AAO has established expectations and both objective and subjective performance measures to monitor the performance of MHC against the current contract. These performance measures have significantly improved over the last several years and assign high priority to achieving safety-related performance objectives and milestones. Currently, authorization basis improvements and excellence in project management to achieve those goals in accordance with IWAP are the highest priority performance objectives in the contract performance evaluation and measurement plan. In an effort to accelerate the identification and implementation of improved hazard controls at the facility and activity levels, AAO and MHC emphasized completion of the conversion of the Critical Safety System Manual to TSRs. This action provided a clearer definition of safety system operability and established appropriate safety systems administrative controls and surveillance requirements, which were previously lacking. In addition, increased attention is also being placed on addressing two of the major hazards (lightning and fire protection) in a more timely manner through the current BIO upgrade program.

Although recent actions demonstrate that authorization basis improvements are currently a priority at Pantex, the priority and resources to support these initiatives have not always kept pace with the increasing level of expectations. As a result, the complexity of development, flowdown, and implementation of authorization basis products was underestimated, and the required resources were not

fully quantified or effectively accounted for in near-term planning and budgeting. Before July 1999, project management responsibilities for weapons programs and nuclear explosives hazard analyses resided at AL and design agencies, respectively. MHC did not have adequate technical expertise in authorization basis development to carry out its newly assigned authorization basis responsibilities in this area. Also, MHC lacked the project management capability, mechanisms, and processes to effectively determine critical paths and accurately quantify resources required for project plans. Accountability for project execution was not clear within the MHC organization or with the design agencies to support commitments made during SMT meetings. Processes for defining, grouping, and assigning relative priorities to site work activities were cumbersome and did not provide MHC and AAO senior management the information necessary to balance limited program funding against increased authorization basis requirements.

**Pantex has reprioritized funds for authorization basis activities.**

Pantex line management indicates that current funding levels are not sufficient to perform the assigned stockpile project activities or fund some authorization basis activities. Because of the high priority of authorization basis activities, Pantex is supplementing funded authorization basis activities by requesting additional “plus-up” funding and by using general plant project funds. However, the use of general plant project funds to support higher plant priorities contributes to deferral of needed plant infrastructure upgrades, such as roof replacements and fire protection system improvements. Pantex line managers also indicate that meeting newly identified authorization basis requirements affects productivity and thus can increase the cost of weapons program activities. In responding to these cost pressures in the past two years, Pantex line management has demonstrated its commitment to providing funding to authorization basis activities (e.g., additional funding allocations). However, these trends highlight the importance of having effective project management tools and processes that provide Pantex Plant line management at all levels (DP, AL, AAO, and MHC) with accurate information for making informed decisions about the allocation of limited resources.



Nuclear Operations facility



**Pantex has taken action to improve project management and resource planning.**

Recognizing the above concerns, AL and AAO have taken several actions to further improve project management and resource identification and prioritization of sitewide activities:

- Ensuring that the Pantex contractor recognizes the importance of effective program/project management. This increased emphasis is reflected in the contract performance evaluation and measurement plan and is the third highest priority of concern. This priority was communicated to MHC senior management for consideration in developing the Priority Decrement List for the current fiscal year.
- Using the SMT meetings to improve monitoring of design agencies and progress, and holding them accountable for deliverables. Future SMT meetings will include a review of all outstanding design agency commitments as part of the standard agenda.
- In conjunction with DP, developing a more flexible and risk-based approach for scheduling project work. For example, on a case-by-case basis, weapon system NESS extensions are being granted to help provide more flexibility in IWAP schedules. This flexibility helps ensure that project plan schedules are based on the actual time needed to perform the work rather than being driven by the NESS expiration date.

- In coordination with DP, ensuring that authorization basis activities receive sufficient priority and attention. Priority ratings for authorization basis activities within the Priorities Decrement Lists indicate that many important authorization basis activities were not being assigned a high priority relative to other plant work and were not funded. AAO and MHC personnel indicated that, from a historical perspective (since 1996), authorization basis improvements were not assigned a sufficiently high funding priority.

MHC has also implemented or initiated a number of activities, such as:

- Placing increased priority and emphasis on strong project management principles. This emphasis has the direct support of the new MHC General Manager. Specific actions to improve project management include empowering MHC project managers to direct projects and establish accountability of project team members from MHC support organizations, hiring outside expertise to help mentor current project managers and improve project management tools and guidance, establishing an MHC project support office to develop a training and qualification program for project managers and to develop improved project management guidance, upgrading current project management tools to help determine critical paths of projects and their interdependencies, improving and standardizing performance measures and associated reporting, and focusing on early identification of potential problems (30/60/90-day reporting requirement) before they become significant.
- Improving coordination and interfaces with design agencies. Design agencies play an important role in the safety analysis but have not always provided the needed deliverables on schedule. MHC relies on the design agencies to provide the needed services but does not directly control their resources or priorities and thus has limited ability to influence their priorities. To enhance cooperation, MHC is working on better communication (written as well as verbal) of expectations for design agency support of projects and improved monitoring of progress of design agency commitments/deliverables, particularly with the Weapons Safety Specification

information that is required as input to weapons hazard analysis reports. MHC is also reviewing ways to make better use of the onsite Tri-Lab group and has established a liaison position (located at AL) to interface with the design agencies.


- Improving prioritization and planning efforts. MHC has established an improved process for defining, grouping, and assigning relative priorities for work activities. They have also established a process for performing comprehensive validation of proposed budget items. This process is conducted in conjunction with AAO representatives and has been successful in ensuring that both AAO and MHC have a common understanding of and increased confidence in the scope of work activities and required resources. MHC is also developing a long-range (six-year) plan that establishes priorities and resource loading (based on a flat funding profile).

 **The improvements are generally appropriate.**

The improvements and initiatives listed above are generally appropriate and are beginning to have a positive impact on the site's ability to effectively perform safety analysis and develop authorization basis documents. However, integration and implementation of complex processes, such as authorization basis activities, will require continued improvements in project management capability. Such planning is increasingly important during a time of limited and decreasing budgets. Several important areas need continued and increased line management attention:

- **Project management capability.** Actions to improve project management are ongoing but not yet complete. As yet, Pantex does not have the project management systems in place to fully and efficiently identify necessary resources and develop integrated sitewide and individual project work plans to facilitate informed decision-making and establish a defensible basis for budget requests.
- **Analysis of resources, budgets, and potential cost efficiencies.** Some safety analyses and other safety-related activities, including plant infrastructure (e.g., fire system upgrades), have not received funding. Continued use of general plant

project funding to support authorization basis work and other higher-priority activities prevents the site from implementing needed upgrades in infrastructure (“mortgaging the future”). The current processes for identifying, prioritizing, and allocating resources are not sufficiently mature for managing the IWAP and related activities.

 **Additional attention is needed to ensure the effective use of DP technical personnel in support of AAO as the approval authority.**

An area that needs particular attention at DP is the efficient and effective use of DP technical personnel to support AAO (which is the designated DOE decision-maker for authorization basis efforts related to Pantex) in their efforts to complete authorization basis enhancements and analyze the level of safety of proposed site operations. The respective roles of DP, AL, AAO, and national laboratory personnel in the review process constitute a longstanding issue that was a subject of the “120-Day Study.” Ensuring sufficient technical support to AAO is particularly important because of the very limited budget for contractor support to AL and AAO. DP has technical staff who historically have been involved in the review and critique of authorization basis documents in support of the approval authority (historically, DP-1 for many authorization basis documents). The delegation of the approval authority to AAO warrants a reassessment of the use of DP technical staff to determine how they can best support the AAO and other DP field element approval authorities. Specifically, DP needs a process to prioritize the activities of DP technical specialists to optimize technical support to the field elements in quantifying the safety of proposed site operations so that the responsible DOE line managers can make informed safety decisions. Currently, DOE Headquarters resources are being assigned to support field operations informally, without a structured processes that considers mission and safety priorities.

**Summary.** AL and AAO recognize the need for improved planning guidance and coordination mechanisms, and have developed the AL D&P Manual to provide a framework for project management. AAO and MHC have implemented several processes to enhance project management and planning, such as the IWAP. Although management has demonstrated that improving the authorization basis is a high priority

at Pantex, the priority and resources to support these initiatives have not always kept pace with the increasing expectations. Also, MHC lacks the technical expertise in authorization basis development and project management systems to effectively carry out its new authorization basis responsibilities. Both AL/AAO and MHC have taken several additional actions to further improve project management, resource identification, and prioritization of sitewide activities, such as the emphasis on project management in the contract performance evaluation and measurement plan. The AL/AAO and MHC improvements and initiatives are generally appropriate and are beginning to have a positive impact on the ability to effectively perform safety analyses and develop authorization basis documents. However, authorization basis activities will require continued improvements in project management capability and the utilization of resources, including DP technical expertise.

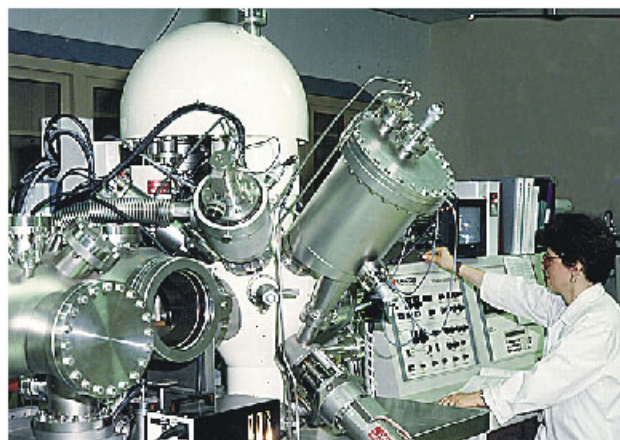
**Guiding Principle #5 – Identification and Flowdown of Requirements:** An effective safety management system must include processes to identify, communicate, execute, and monitor all applicable DOE requirements and Federal, state, and local regulations. In addition, processes that provide change control and maintenance mechanisms for a given set of baseline requirements must be in place. Translating these requirements into policies, programs, and procedures; tailoring them to specific work activities; and effectively implementing them so as to protect workers, the public, and the environment are a necessary and integral part of an effective safety management system.

Identification and flowdown of requirements have been a longstanding and recurring problem at Pantex. The 1996 Office of Oversight safety management evaluation of the Pantex Plant identified issues associated with the need for developing a common understanding and acceptance of the standards/requirements identification documents (S/RIDs) as the basis for a standards-based culture, implementing requirements, and completing SARs for Pantex facilities. The April 12, 1998, DOE implementation plan for addressing DNFSB Recommendation 98-2 also recognized the need for standards to enable flowdown of requirements for developing authorization basis documentation. The 1998 Phase I and II ISM system verification report for the Pantex Plant, while noting some improvement in the use of the management, integration, and controls S/RID process, cited several areas where standards still needed to be developed as flowdown mechanisms for

requirements, including those related to authorization basis development and change control. In 1999, the MHC General Manager chartered the ABTF to address continuing authorization basis problems at the Pantex Plant. As part of their findings, the ABTF noted a lack of standards for executing authorization basis documents and the lack of a well-defined process for flowdown of SARs and HARs to their respective controls (e.g., ABCDs).

**The contractor has made considerable progress in addressing many longstanding and recurring issues in requirements management.**


MHC has made considerable progress in addressing many of these recurring issues. The Pantex Plant ISM Authorization Basis Manual defines the processes for developing all authorization basis documents across the Plant, including those for facilities involving nuclear explosive operations and for nuclear explosive operations themselves. Pantex Plant standards have now been developed as the implementing mechanisms for the processes defined in the Authorization Basis Manual. These standards include STD-3071, “Development and Revision of Authorization Basis Documents,” STD-3073, “Implementation of Authorization Basis Changes,” and STD-3075, “Authorization Basis Review, Approval, and Change Control.” The Authorization Basis Manual and Authorization Basis standards have been incorporated in Appendix C, “MIC Standards & Requirements Flow Down,” of the MHC ISM description document. These implementing documents are also linked to the MIC S/RID that is incorporated in the MHC contract.




Testing equipment



Processes for the flowdown of controls to the facility and weapons process levels are in place. Production managers, operations managers, facility manager, and production technicians participate in weapons systems core teams as well as “end-user” reviews of authorization basis documentation. Their participation affords facility and weapons operations personnel the opportunity to provide input to and gain understanding of the basis for controls that are ultimately implemented for each of the weapons processes and associated facilities. As a result, they recognize and are familiar with the controls that are being implemented. However, complete “buy-in” to the concept of multiple controls has not been fully achieved, and some individuals expressed frustration with what they perceived as excessively redundant controls.

 **Appropriate DOE directives and standards are being applied to authorization basis processes.**

Appropriate DOE directives and standards are being applied to the development, review, and implementation of authorization basis documents and processes, and are meeting the intent of integrating applicable safety basis requirements. Although there are some areas where effective implementation has not been achieved as discussed throughout this report (e.g., the annual update requirement of DOE Order 5480.23 has not been met for the Building 12-116 Final Safety Analysis Report [FSAR]), these directives and standards provide a consistent framework upon which the Pantex authorization basis is being built. In addition, the contractor has developed the MHC Authorization Basis Manual, which integrates authorization basis within the principles of ISM and also serves as the mechanism for bringing all applicable directives and requirements together to form the basis for the development, review, and implementation of the authorization basis. The MHC Authorization Basis Manual, which has been accepted by AAO, is a positive step toward integrating requirements that support the authorization basis. However, there are some areas that the manual has not yet addressed, such as providing guidance on integrating lessons learned into the hazard analysis process for both weapons and facility authorization basis activities.

 **DOE and the contractor have not been effective in developing implementation plans for DOE orders.**

Although progress has been made on the development and flowdown of standards for authorization basis development and implementation of controls, DOE and MHC line management have not been effective in implementing DOE Order 452.2A, *Safety of Nuclear Explosive Operations*, in a timely manner. In January 1997, the Department issued DOE Order 452.2A, which applies to nuclear explosive operations and associated facilities, and invokes DOE Order 5480.23, *Nuclear Safety Analysis Reports*. As a requirement of DOE Order 452.2A, operations offices are to develop implementation plans describing how the requirements of the order will be implemented, and submit the implementation plan to DP-20 for approval. However, the DOE did not approve the MHC implementation plan for DOE Order 452.2A and the AL supplemental directive until September 1999.

DOE has not been responsive in providing timely comments on the draft implementation plans submitted by MHC. MHC submitted the original version of the DOE Order 452.1A and DOE Order 452.2A implementation plan to AAO in April 1998. That version proposed that an exception be granted, and that the contractor be allowed to proceed with the BIO upgrade program to upgrade the BIO in modules to meet DOE Order 5480.23 standards. There is no evidence of a formal AAO response to this submission. In May 1998, DOE Order 452.2A was incorporated into the MHC contract, and MHC submitted a revised implementation plan to AAO in June 1998 for approval. There is no evidence of a formal AAO response to the revised implementation plan. MHC submitted a second revision of the implementation plan to AAO for approval in August 1999 and provided an impact analysis for implementing supplemental directive AL 452.2A. AAO approved the second revision in September 1999 with a few conditions related to configuration management. In the various revisions of the implementation plan, MHC recommended that all weapons programs developed prior to the W-69 weapons program not be required to be backfitted to meet DOE Order 452.1A/2A and AL supplemental directives. Their rationale was that the authorization basis for those programs had been thoroughly evaluated and documented. There is no

evidence that DOE responded to that recommendation, by either accepting or rejecting it.

The current version of the MIC S/RID, however, continues to adopt supplemental directive AL 452.2A, paragraph 4.c. (1) (d) 1, which allows an “equivalent interim document (e.g., BIO)” in lieu of an SAR and takes exception to paragraph 4. c. (1) (d) 1 of DOE Order 452.2A, which requires an SAR for facilities used for nuclear explosive operations. In addition, during the period of the Oversight evaluation, it was noted that the MIC S/RID incorrectly stated that the implementation plan still required DOE approval.



**Pantex does not have an approved implementation plan describing the detailed steps for how a site SAR will be developed and implemented and result in a set of integrated controls.**

There is presently no approved implementation plan in place describing the detailed steps for how a site SAR will be developed and implemented and how both the site/facility SARs and weapons processes (HAR) will be integrated and result in a set of integrated controls. Not until recently did AAO ask MHC to prepare a SAR implementation plan. In a March 2000 letter, AAO asked MHC to prepare and submit a SAR development and implementation plan by July 3, 2000, for FY 2001, identifying the steps necessary to achieve an integrated site SAR. The letter also requested a high-level program logic diagram “of sufficient detail to identify weapon program and facility authorization basis activities, interrelations, dependencies and ties necessary to portray a clear picture of the critical path and relation of all activities required to reach the end state.”

**Summary.** AL, AAO, and MHC recognize the longstanding and recurring problems in identification and flowdown of requirements and have made improvements. The development of the Pantex Plant ISM Authorization Basis Manual and implementing standards is a significant step forward. Similarly, the improved processes for the flowdown of controls to the facility and weapons process levels are now in place and understood by the supervisors and technicians. Although progress has been made in this area, DOE and MHC line management have not been effective in developing timely implementation plans for DOE Order 452.2A, and DOE was not responsive in their review of contractor submittals. In addition, there is currently no approved implementation plan in place

describing the detailed steps for how a site SAR will be developed and implemented and how both the facility (SAR) and weapons processes (HAR) will be integrated and result in a set of integrated controls.

**Guiding Principle #6 – Hazard Analysis and Controls:** To conduct work safely, line management must ensure that structured processes exist and are implemented sitewide to identify and analyze work hazards consistent with the complexity of the work activity and the significance of the risk. The appropriate engineering and administrative controls and personal protective equipment must then be established to prevent or mitigate those hazards.



**Pantex has a strategic approach to improving its authorization basis.**

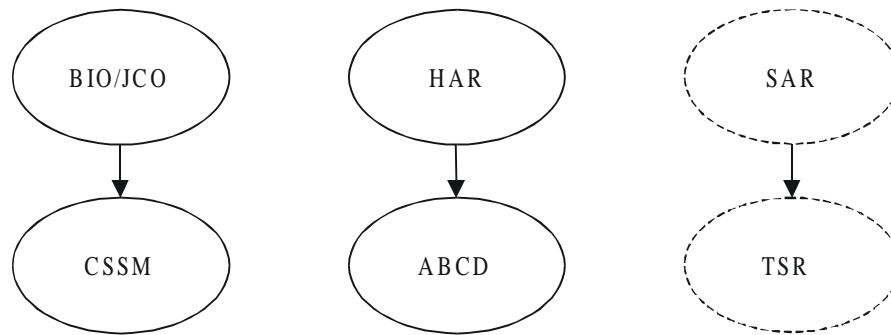
At the time of the 1996 Office of Oversight evaluation, Pantex had few approved hazard analyses and was operating on the basis of a sitewide BIO. Since then, Pantex has completed several analyses, such as the lightning BIO and five HARs. However, Pantex line management recognizes that problems continue, particularly with regard to the coordination between and interfaces among the various types of safety analysis (e.g., stand-alone HARs have analysis that overlaps sitewide analysis). Other efforts, such as a seismic study, are under way and are to be completed according to an approved schedule. Because the full scope of the SS-21 efforts will not be complete until 2005, AL and AAO have defined an approach designed to accelerate safety improvements through completion of various sitewide efforts, such as HARs and sitewide analysis of higher priority hazards (e.g., fire and lightning). As part of this approach, the Pantex Plant is working to better define the “end state” of the authorization basis documents to more clearly define a set of analyses that are mutually supportive.

Figure 2 shows the strategic approach that Pantex is using to develop future authorization basis documents.

### ***Sitewide and Facility Hazard Analyses***

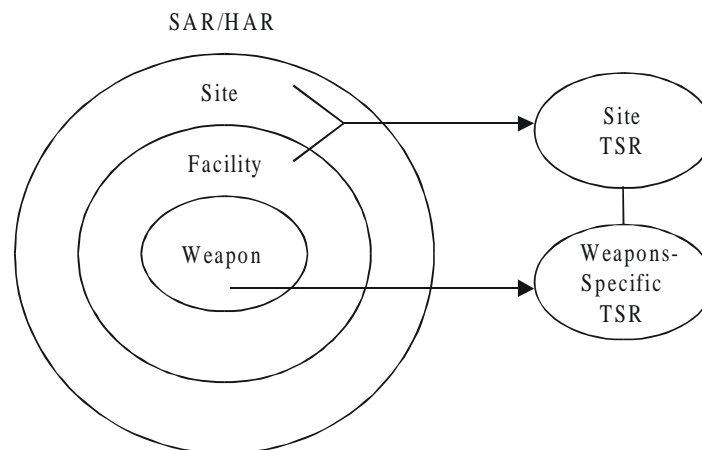
The Office of Oversight review of the sitewide and facility hazard analyses considered the key overall sitewide documents – the Pantex Plant BIO (NML-00076) and General Information Document. The team also reviewed selected sitewide BIOs that analyze hazards that pose similar threats to most facilities and weapons systems. These included the recently completed lightning BIO and the efforts on the

## Historical Approach



- Large and unbounded HARs overlapped BIOs and other documents—poorly coordinated efforts resulted in overlaps, inconsistent approaches, conflicting assumptions, and delays in progress
- ABCDs contained numerous controls, were inconsistent among programs, and overlapped the CSSM
- BIO, JCO, and CSSM had limited technical analysis (expert based) and did not address all hazards
- SAR and TSR were inconsistent, overlapping, and not approved (dashed circles above)

## Strategic Approach



- Hierarchy of mutually supporting documents
- Common hazards (e.g., fire) handled consistently across site and facilities
- Facility hazards analyzed for all weapons
- Weapons-specific controls derived from HARs are an addendum to the site and facility TSR to establish comprehensive controls for each weapon system

ABCD	Activity-Based Control Document
BIO	Basis for Interim Operation
CSSM	Criticality Safety System Manual
HAR	Hazard Analysis Report
JCO	Justification for Continued Operation
SAR	Safety Analysis Report
TSR	Technical Safety Requirement

**Figure 2. Strategic Approach to Developing Authorization Basis Documents at Pantex**

transportation BIO, which is undergoing major revision. The current Pantex Plant analysis of fire hazards and efforts on the fire BIO were also reviewed both sitewide and at selected facilities.

 **The Pantex Plant operates according to a sitewide BIO and GID, which need to be updated.**

**BIO and General Information Document (GID).** The BIO is part of the March 2000 Master Authorization Agreement. Since 1995, the BIO has served in place of a SAR for most Pantex nuclear facilities, including the cells, bays, and special purpose facilities.

Although the BIO is an approved document that provides a formal basis for interim operations, the current BIO does not provide a comprehensive and systematic assessment of hazards in accordance with the current standards (DOE-STD-3009, *Preparation Guide for U.S. DOE Nonreactor Nuclear Facility Safety Analysis Reports*). In addition, some aspects of the BIO are incomplete, are outdated, or reference outdated accident analyses, such as old FSARs. For example, the BIO does not evaluate hazards associated with the flooding of cells and bays from both external (e.g., site flooding) and internal (e.g., failure of high-pressure fire piping) events, which had occurred fairly often in the past. Similarly, the hazard and accident analyses for most Pantex nuclear facilities do not meet current standards. For example, the analysis of high-explosive detonation/deflagration (HED/D) accidents focuses on public protection; protection of workers is not specifically analyzed.

The GID is also identified in the Master Authorization Agreement as part of the authorization basis and applies to all nuclear facilities. The GID has not been updated since June 1995, and thus does not meet DOE Order 5480.23 requirements for annual updates. Neither the BIO nor the GID reflects some existing analyses, such as the 1998 seismic hazard characterization study and ongoing seismic evaluations of facility structures (bays and cells) and equipment. For example, the draft report for the Building 12-98 seismic evaluation indicates that the potential collapse of ducts and diffusers in the cells poses a threat to weapons operations that was not previously considered. The current plan is to adopt the new seismic evaluations into the individual modules of the BIO in 2001. An important follow-on step will be to

evaluate existing safety systems to determine whether they will satisfy the new seismic design/evaluation values.

Both AAO and MHC endorse the concept that the BIO is the authorization basis document that describes facilities and processes, but the BIO does not provide the justification for TSR controls. This concept is not clearly defined and will be difficult to employ unless clearer distinctions are made between the authorization basis and non-authorization basis parts of the BIO.

AAO and MHC are aware of the shortcomings of the BIO and GID and have a major upgrade effort in place. However, the progress on this upgrade has been slow. Recent attention and priority have accelerated the progress and development of an approach, as identified by the revised implementation plan for DNFSB Recommendation 98-2. For example, the lightning BIO was recently completed, and the transportation and fire BIO are being developed. More detail regarding the end products and the many interfaces is needed to ensure the effective and efficient completion of the authorization basis documents.

 **AAO and the contractor have completed a BIO for lightning.**

**Lightning Hazard Analysis.** The Office of Oversight team reviewed the recently issued lightning BIO (MNL-PTX-277516, dated 2/7/00) to determine whether it adequately encompasses protection of weapons from lightning, which could otherwise lead to potentially serious events such as inadvertent nuclear detonation. The lightning BIO provides a comprehensive discussion of facility hazards that arise from lightning-induced electrical energy that could conceivably lead to an inadvertent nuclear detonation. According to the BIO, the engineered and administrative controls reduce the likelihood of an inadvertent nuclear detonation to “beyond extremely unlikely” levels. The analysis and testing for the facility Faraday cages, installation of engineered bonding, and implementation of standoff distances provide assurance that lightning-induced voltage surges are minimized within the facilities.

The lightning BIO lists planned upgrades and corrective actions, including hardware fixes, training, and procedure updates. The funding and implementation plan for the corrective actions are in place, and many of corrective actions are complete. The only concern identified with the lightning BIO

for which there is currently no definitive resolution involves the lightning detection system. Pantex uses the Static Potential Monitoring System but does not have a defensible technical basis for the setpoint for the systems that ensures a timely warning. As a supplemental measure, Pantex is working with the local airport authority to use information from the airport system that monitors thunderstorms and the potential for a lightning strike.

**Transportation Hazard Analysis.** The current BIO (MNL-00076) has a transportation module that provides the basis for interim operation. AAO and MHC recognize that transportation hazards have not been properly characterized in the existing BIO and that there is considerable reliance on administrative controls to prevent accidents. The effectiveness of the various administrative controls has not been quantified.

■ **AAO and the contractor are working to develop a new transportation BIO.**

MHC has been working on a sitewide transportation BIO for over two years. The scope of that BIO covers “full-up” (fully assembled and operational) weapons. AAO has reviewed a version of the transportation BIO (September 1999) and has provided comments. A new transportation BIO, under development, will address full-up weapons and partially assembled weapons. MHC plans to further expand the scope to include special nuclear material. At this time, there is no plan to include high explosives in the scope.



Onsite transportation

Although not finalized or approved, the current analysis indicates that certain transportation accidents have higher frequencies than accidents in bays and cells and that transportation accidents (e.g., a forklift collision accident involving puncture of high-explosive cans) could lead to a nuclear material dispersal. Administrative controls are heavily relied upon to prevent such high-consequence accidents.

■ **Efforts are under way to further reduce risks associated with transportation.**

AAO and MHC are working on various options for further reducing the risks associated with postulated transportation accidents. MHC is considering introducing new administrative controls to completely separate high explosive moves from the nuclear explosive movements. However, when credit is taken for this new proposed control, the probability of a nuclear detonation from this scenario is higher than the acceptance criteria. In addition, AAO and MHC are evaluating physical controls, such as enhanced carts/vehicles for transporting weapons and other special nuclear material items.

While AAO and MHC recognize that improvements are needed in the transportation BIO and existing controls, the preliminary analysis indicates that transportation accidents are a potentially significant contributor to risk at Pantex. The timely completion of the new transportation BIO is an important step in ensuring that decision-makers have a valid technical basis for making informed decisions. In addition, options for deploying passive engineered features have not been fully assessed to determine how to reduce the reliance on administrative controls.

**Fire Hazards Analysis.** The Pantex authorization basis documentation and supporting analyses define a multi-faceted fire protection program that exhibits “defense in depth.” Facets of this program include written program requirements, fire hazards analyses for facilities and weapons systems, controls on combustible materials and ignition sources, compartmentation and fire-resistive construction, automatic and manual fire suppression systems, a qualified staff of fire safety professionals, fire safety training, and a fully capable site fire department.



**A plan for the fire protection BIO has been developed.**

The fire safety-related authorization basis documentation includes the new fire protection BIO, which is scheduled for completion in July 2000. With some possible minor exceptions for certain scenarios involving a fire department emergency response, the plan for this new BIO appropriately addresses applicable DOE directives, comprehensively addresses fire hazards and resulting scenarios, and uses conservative and validated analytical techniques to determine required fire safety measures.

With respect to emergency response, there is a spectrum of credible fire scenarios outside of the bays and cells, such as a fire involving stored combustible materials in the ramp area, where the fire department would play a critical role in emergency response. Additionally, many facilities are completely protected and some areas partially protected by conventional wet-pipe sprinkler systems. These systems are designed to control, but not completely suppress, a fire. Fire department intervention is needed to mitigate fire effects (such as smoke migration), extinguish the fire, and attend to casualties among operating personnel, among other responsibilities. The current authorization basis documents and supporting analysis do not address scenarios and critical functions comprehensively. Fire department response is intended to be included in the revised fire protection BIO. However, the fire protection BIO project plan does not provide sufficient details to determine whether it will adequately address the spectrum of scenarios in which a fire department response would be needed.



**There are recognized weaknesses in the fire protection system.**

Currently, significant weaknesses in the fire protection system are recognized. A new system was partially installed, but work was stopped in 1997 because of circumstances beyond the Pantex Plant's control (the manufacturer stopped producing the system and spare parts). In August 1999, the Pantex Plant developed a plan for long-term resolution that involves a redesign of the system and the replacement of antiquated and incompatible components. The

redesign/replacement of the fire system should be a high priority at Pantex because of its safety significance and because the site fire alarm and signaling system is "safety class," and thus an outage of significant duration could necessitate the suspension of operations.

In most areas where nuclear explosives may be present, the Pantex Plant now has a project for putting in place an ultraviolet (UV)-initiated deluge system that is designed to initiate rapidly in the event of a fire. A 1997 study and subsequent analysis determined that the heat detector-initiated deluge would be too slow in some fire scenarios. After being taken out of service for some time, the UV-initiated deluge system is being placed back in service. However, Building 12-44 does not have UV detection sensors and therefore lacks the protection afforded by the rapid-activating system. The cost of the conversion in Building 12-44 has been estimated to be at least \$3.1 million. No funding has been allocated for this upgrade. An October 1999 MHC request for line item funding has been met by a March 2000 request for additional information by AL.

The fire system upgrade is identified in the implementation plan for DNFSB Recommendation 98-2. The Office of Oversight will monitor the fire protection upgrade by monitoring Pantex's progress toward meeting the DNFSB commitments. The current authorization basis relies on administrative controls rather than engineered features to assure timely and effective fire suppression for certain credible fire scenarios. A commitment to resolve this issue is contained within the revised implementation plan for DNFSB Recommendation 98-2. The Office of Oversight will monitor Pantex Plant progress in addressing the commitments to the DNFSB regarding the concerns with the current fire protection system.

A non-nuclear facility in Pantex Zone 11 was reviewed. Certain operations involving explosives are performed in this facility. Portions of this building are protected by UV detector-initiated deluge systems, but other portions are not. For example, some explosives are exposed to fire hazards (isopropyl alcohol, combustible materials, and ignition sources). Fire protection in this area relies on operator actions with portable fire extinguishers and a conventional wet-pipe sprinkler system (which is not as effective as a deluge system in certain scenarios). There is currently no technical basis, such as an engineering analysis, to demonstrate that this system will function in a timely manner.

## Facility-Level Safety Analysis for Building 12-116

The FSAR of the Special Nuclear Material Component Staging Facility (RPT-SAR-210640), Building 12-116, was prepared according to the requirements of DOE-STD-3009, which outlines a systematic process for comprehensively analyzing hazards. The FSAR provides a detailed treatment of the hazards associated with plutonium pit storage. Hazard and accident analyses are documented as required by DOE Order 5480.23. The design basis accidents cover natural phenomena (earthquake, tornado/winds, flood, and lightning strike), external accidents (explosion, aircraft crash), and operational accidents (pit drop, criticality, radiography exposures, and forklift impact). Derivation of TSRs has been adequately documented. The FSAR determined that there were no safety-class systems, structures, and components.

Although the Building 12-116 FSAR is generally adequate, there are some problems with interfaces, overlaps, and references to outdated documents that have not been rigidly updated and maintained. As with other authorization basis documents, the Building 12-116 FSAR needed better documentation of hazard identification, analysis, and controls. In addition, the Facility 12-116 FSAR does not currently address seismic resistance of pit storage or the consequences of collapse of pallets holding pits in drums and needs to be updated. The FSAR does not identify the worst-case criticality scenario, elucidate any margins of safety, or specifically address worker safety concerns.

### Activity-Level Hazard Analysis

At the activity level, the HARs are the primary documents that identify and analyze potential hazards and establish the technical basis for controls for work activities related to specific weapons systems. As discussed previously, MHC has been assigned overall responsibility for development of HARs for each weapons system that will be undergoing dismantlement and/or inspection at Pantex. However, the national laboratories have a critical role in the HAR process because they analyze the expected response of the weapons system to postulated accident scenarios developed by MHC. As part of an iterative process with the laboratories, MHC analyzes the responses and modifies the tooling or the procedure to eliminate hazards or reduce them to acceptable levels. The HAR

process results in the finalized tooling design, the nuclear explosive operating procedures (NEOPs), and the ABCDs (i.e., the set of controls that prevent or mitigate the hazards). HARs have been developed for certain weapons systems, and efforts are ongoing to complete additional HARs and comprehensively analyze weapons system activities as part of the SS-21 process. It is notable that the SS-21 process, where it has been applied, has reduced the need for administrative controls by design of tools and systems that reduce or eliminate hazards (e.g., non-flammable solvents). However, the overall HAR effort and SS-21 process will not be complete for several years, in accordance with established schedules.

**Recent HARs for weapons systems provide a detailed technical assessment.**

The Office of Oversight team reviewed selected aspects of completed hazard analyses for the W-56, W-62, W-76, and W-79 weapons programs. The team focused primarily on fire scenarios, transportation, and electrical events (lightning, static electricity, and testers). In general, the aspects of the HARs that were reviewed provide a detailed technical assessment of the potential accidents. The recent HARs were developed in accordance with established processes and cover a spectrum of accident scenarios. Under the direction of AL and AAO, MHC and the laboratories are working cooperatively to complete HARs, and efforts to improve coordination and accountability are under way, as discussed under Guiding Principles #1 and #2.

Although the technical quality of the analyses was generally good, some aspects of the analysis and documentation of the supporting assumptions and analytical process warrant further improvement:

- **National laboratory input to HARs is often based on expert judgment that is not fully supported by a documented technical rationale.** In some cases, the national laboratories do not provide a documented technical basis that can be referenced in the authorization basis for the expected response to an accident initiator. Some estimated frequencies of occurrence of events also lack a firm basis. Without an adequate documented technical justification for the laboratory's expert judgment, MHC and other technical reviewers

cannot independently verify, confirm, or challenge the inputs from the laboratories. Pantex line management recognizes this problem, and corrective actions are in process to ensure the fidelity of information from the laboratories.

- **HARs do not always provide sufficient information and/or identify supporting reference documents.** In some cases, such as the technical basis for “one-point safety” and electrical surges, the HARs do not include sufficient information to justify the conclusions and do not reference other supporting analyses. In most cases where support was lacking, the Office of Oversight team interviewed personnel, who usually could readily provide a valid technical basis for assumptions and conclusions and could often provide supporting documents that were not summarized or referenced in the HAR. Although much of the analysis is complete, the HARs currently lack sufficient information and references to provide for a self-contained, defensible hazard analysis that allows a comprehensive and rigorous independent review or supports the evaluation of changes.
- **Although there are adequate fire safety features, the identification and analysis of fire hazards are inconsistent and not well-documented.** The various HARs and other documents focus on fire as a major contributor to risk but do not always conservatively assess the spectrum of potential fire hazards and scenarios. Many documents summarize previous conclusions without providing supporting data and analysis. In some cases, such as the HAR for the W-76-0 /Mk 4 and W-62 disassembly and inspection operation, the analyses are based on assumptions that are unsupported or that exclude credible scenarios from consideration. An onsite DNFSB staff member recently identified a scenario that had not previously been considered. Although weaknesses are evident, the Pantex Plant has multiple safeguards in place to provide a safety margin.
- **The scope of, or the boundary between, the HARs and the SAR/BIO is poorly defined at this time.** The current HARs contain too much information, a large part of which would be more appropriately included in the SAR or the BIO. The HARs need to analyze all high-consequence

weapons-specific scenarios, especially those that are outside the facility’s confinement capabilities; the remaining scenarios should be addressed in the SARs/BIOs.

- **Most of the current controls (TSRs and ABCDs) are based on the HARs, master studies, lightning BIO, and the yet-to-be-completed transportation BIO, and did not originate from a systematic evaluation of the hazards identified in the facility BIO.** Consequently, there is insufficient assurance that all of the important controls have been developed and are in place. For example, separation of high explosive and nuclear explosive movements, and the use of the “war wagon” concept to protect the weapons during transportation might have been identified much earlier if a systematic process had been employed.

The Pantex Plant also needs to continue to work to resolve longstanding problems with the consistency in approaches and interfaces between HARs and other authorization basis documents (e.g., SARs). Problems that need continued attention include the overlap between HARs and SARs/BIOs (HARs contain information that is now superseded by BIOs), consistency in the scope of HARs, and outdated or unapproved references (e.g., the W-56 HAR takes credit for a June 1998 transportation BIO that was never accepted by DOE). In general, these weaknesses in documentation and consistency are well understood by AAO and MHC. Efforts are under way to address them under ongoing site initiatives, such as authorization basis upgrades and the revised implementation plan for DNFSB Recommendation 98-2. These efforts are well-designed and, with sustained management attention, are appropriate means to address current problems with existing HARs, which were prepared at various times under differing guidance.

### ***Flowdown of Hazard Analyses Into Controls and Procedures***

Based on the various hazard analyses (e.g., SARs, HARs, BIOs), DOE sites are required to systematically develop controls in accordance with DOE orders and standards (e.g., DOE STD-3009). These controls must be clearly communicated to workers through procedures and other such formal direction and must be fully and effectively implemented. Using a



sampling approach, the Office of Oversight team examined selected hazard analyses and associated controls, with emphasis on determining whether controls are established based on the hazard analysis and appropriately flow down to the procedures used for operations and work activities on the “shop floor.”



**Controls are generally established and clearly communicated to workers.**

At the Pantex Plant, site- and facility-level controls are established in TSRs and implemented through various MHC procedures. Activity-level controls are identified in ABCDs and safety instructions and implemented through NEOPs and other MHC operating procedures. The review of these documents generally indicated that controls are established and clearly communicated to the workers through procedures. For example, site TSRs establish fire safety controls for fire safety systems (e.g., site fire alarm and signaling system, water distribution system, and certain fire suppression systems) as well as combustible materials and ignition controls. Representative procedures reflect these controls and conform with DOE fire safety directives and National Fire Protection Association codes and standards for scope and frequency of inspections. In addition, MHC maintains close communication and coordination with the weapons laboratories to ensure proper implementation of the safety instructions.

In conjunction with AAO, MHC is working to improve controls in various areas. As part of the SS-21 process and HARs, the Pantex Plant is taking a systematic and comprehensive approach to establishing controls and operating procedures and, where appropriate, revising processes and redesigning tools to make the implementation of controls more effective. AAO and MHC are also working on transitioning from administrative to engineered controls where appropriate. The ongoing development and implementation of engineered controls for lightning/electrical surge protection and special carts for transporting weapons systems are examples of efforts to further enhance safety through better controls. As discussed elsewhere in this report, operators and technicians are devoting significant time and effort to implementing newly established controls, such as operational checks and surveillance requirements for various areas (e.g., fire safety).



**Component storage at Pantex**

In general, the controls based on HARs are clearly defined and identified in ABCDs, NEOPs, and other procedures. No significant weaknesses were identified in the controls derived from HARs, although the boundaries, interfaces, and cross-references between controls based on HARs and those based on BIOs will require continued attention. In some instances, HARs identify facility-specific controls that are required for the weapons instead of referring to the facility BIOs, and the cross-references are not consistent for some existing HARs and BIOs.

Although improvements are being made, there are some weaknesses in the flowdown of site and facility hazard analysis to controls and subsequently to operating procedures. Such weaknesses were evident in the review of “Estimates of Offsite Radiological Consequences from Postulated Cell Facility Accident Scenarios,” RPT-MIS-163913, which is the basis for the current plutonium inventory limits for the cells. This document includes analysis of an HED/D accident and indicates that the worst-case estimated offsite consequence for several cells is about 25 rem. The analysis focuses primarily on the potential leakage through cell door seals. As discussed below, some aspects of the controls on leakage pathways are not clearly defined, do not have a sound technical basis, or are not complete:

- Although the hazard analysis takes credit for door seal gaps, the TSR does not quantify any leak parameters and does not establish clear controls for the gaps on door seals. Thus, requirements for control and surveillance of door seal gaps are not clearly identified. However, the consequence analysis that supports current cell plutonium inventory limits takes credit for a “transmission factor” associated with a ¼-inch gap in the door

seals that reduces the estimated leakage by a factor of 0.31. While the parameters are currently captured in the surveillance procedure used for determining leak areas, the authorization basis document needs to specifically identify the ¼-inch gap limit and the surveillance method. The controls in the TSR replaced controls previously specified in the BIO, which set limits on both seal leakage areas and gaps. Thus, in this instance, the adoption of the TSR did not fully address the previous controls specified in the BIO. Pantex line management has committed to restoring the gap limits in the authorization basis.

- Controls are not established for pathways that were not fully analyzed. RPT-MIS-163913 considers only leak paths through the door seals. It does not address other potentially important cell penetrations, such as electrical conduits, fire protection piping, or cable sheathing, which could become leak pathways after high-explosive detonation. The failure of a penetration could become an important leak path, and therefore it is not fully assured that the worst-cases consequences have been fully identified and analyzed.
- The BIO and TSR do not analyze the potential for leakage through heating, ventilation, and air conditioning ducting blast valves or cell waste drains, or the possibility of a bypass of the waste isolation valve system from a fire scenario with deluge system flooding before detonation. The BIO and TSR only briefly discuss blast valves and do not include a documented rationale for the assumption that they will remain leak-tight after a detonation (although AAO indicates that the blast valves are tested and inspected to meet manufacturer’s specifications). The cell waste drains are discussed only in a cursory manner. The analysis does not specifically address certain scenarios such as bypass of the Waste Isolation Valve System from a fire scenario with deluge system flooding before detonation – Pantex line management considers such a scenario incredible, but has not formally analyzed this scenario. As a result, controls are not in place for such scenarios. For example, cover plates over shower drains outside cells in Buildings 12-85 and 12-96 serve a safety-class function but are not listed as such. Potentially non-conservative estimates of leak

paths may invalidate bounding consequence estimates and subsequent radioisotope inventory limits for Pantex bays and cells.

Potential weaknesses in controls, such as those cited above, often result from the fact that the Pantex Plant does not yet have a mature and comprehensive set of hazard analyses that meets current requirements for rigor and comprehensiveness. In the absence of a comprehensive set of hazard analyses, it is not possible to ensure that all accidents have been analyzed and that all necessary controls have been established, as envisioned by DOE standards (e.g., STD-3009). The lack of a comprehensive set of authorization basis documents is the subject of the legacy issue identified in the 1996 Office of Oversight safety management evaluation. Although the weaknesses in the leakage pathway analysis noted above are evident in documents that have been issued since 1996, they are symptoms of the same general weakness identified in 1996 and are encompassed by the open legacy issue.

However, AAO and MHC have attempted to work with the available hazard analysis to establish controls that provide for acceptable levels of safety until the remaining hazard analyses are upgraded to meet newer standards, in accordance with established plans and schedules. As one important step, MHC recently developed the “Technical Safety Requirements for the Pantex Facility” (RPT-SAR-199801, Rev. 1B, 3/6/00). This document establishes controls based on a compilation and evaluation of controls that were previously contained in a variety of documents, such as the Critical Safety System Manual, legacy operating safety requirements, and the BIO. Further, MHC has documented the process and technical basis for the set of TSRs, in reports such as “Pantex Nuclear Facilities Analytic Basis for the Technical Safety Requirements,” (RPT-SAR-209895, Rev.1, 2/00), which AAO and MHC indicate is currently the most complete documentation of the basis for the TSR controls.



**Some further improvements in controls are needed.**

Although a significant step forward, the TSRs for the Pantex Plant require further improvement in some cases. The following general weaknesses were identified in establishment and communication of controls:

- **The technical basis for eliminating previous controls is not clearly established and documented.** Appendices 1 and 2 of “Selection of Controls for Inclusion in the Technical Safety Requirements” (RPT-SAR-210643, Rev.1 2/00) summarize the compiled controls and surveillance requirements and their disposition. These appendices show that many previous controls were eliminated from the TSR because they were “weapon program specific” or did not serve an “SC (safety class) or SS (safety significant) function.” For several cases, RPT-SAR-210643 does not give a thorough justification for screening out controls (e.g., the radiation alarm and monitoring system and the emergency diesel generators). That is, while some evaluations must have been performed in screening out controls, only conclusions are provided. This report does not currently include information to justify why controls were eliminated. If the justification is contained in another document, then that justification should be summarized rather than simply citing the document without an explanation.
- **Some controls were changed in the TSR development process without a documented technical basis.** For example, the facility inventory limits on radionuclides and high explosives previously established in the BIO were changed when incorporated into the TSR document, but the bases for these changes (e.g., the new limit on U-235) are not explained in the TSR analytic basis document. The basis for the new facility inventory limits on radionuclides and high explosives needs to be fully justified and documented in an authorization basis document.
- **The BIO and TSR do not specify all key design features.** Tables in the TSR analytic basis document present bay and cell structural design features such as roof and wall thickness, fire ratings, and soil/gravel depths that presumably are essential to assumptions made about accident prevention and mitigation. For example, these tables specify minimum and maximum depths of soil and/or gravel above the roofs of the bays and cells. Any changes that result in soil/gravel depths outside the specified ranges could invalidate the authorization basis modeling assumptions and estimated consequences of earthquake, tornado, wind, external fire, aircraft crash, and HED/D

accidents. However, the TSR analytic basis document is not officially part of the current authorization basis, and the BIO and TSR (which are part of the formal authorization basis) do not specify such design features. Thus, it is conceivable that changes in essential design features may escape the USQ process. The site has considered making the TSR analytic basis document part of the formal authorization basis, which would ensure that any subsequent changes are approved by DOE and are subject to the USQ process. However, the site has adopted an approach in which the TSR analytic basis document is a judicious interim measure that is being taken pending the development of a permanent solution (i.e., SARs that comply with current requirements). Pantex line management has determined that it would be necessary to rewrite the TSR analytic basis document to meet STD-3009 if it were to be included in the formal authorization basis. They have also determined that such an effort would be counterproductive in that it would divert resources from the development of the permanent solution. However, in the interim period until the SAR is complete, Pantex needs to ensure that measures and features specified in the TSR analytic basis document are appropriately considered in the USQ process and are not modified without appropriate review and approval.

### **USQ Process**

As a result of external and internal reviews and assessments, AL, AAO, and MHC recognized that the USQ process needed improvement. Their “Pantex Plant Unreviewed Safety Question Upgrade Project Plan (February 2000)” identified a set of key areas for improvement. The improvements include development of USQ standards and procedures, clarification of USQ roles and responsibilities, USQ training, and establishment of an official list of authorization basis documents for both facilities and weapons operations that includes USQ screening and USQD documents not yet incorporated into the other authorization basis documents. As part of the improvement plan, AL, AAO, and MHC developed a set of new and/or revised standards. For example, AL developed Chapter 11.7, *Nuclear Explosive Operations Change Control Process*, to supplement the D&P Manual in June 1999, and MHC developed and issued STD-3014, *Nuclear Facility and Nuclear Explosive Operation Unreviewed Safety Question*.

**The plan to enhance the unreviewed safety question process is well-designed.**

With a few exceptions (discussed below), the upgrade project plan is well-designed, and the revised USQ process, if fully and effectively implemented, will meet the intent of DOE requirements. For example, the new standards are generally comprehensive, include step-by-step instructions, and clearly define roles and responsibilities.

Although the overall USQ program has been improved, this Office of Oversight review identified a few areas where the new processes need to be re-examined and modified as appropriate:

- **As implemented, the USQD process did not ensure that proposed changes in procedures are fully evaluated against a systematic set of criteria.** DOE Order 5480.21, *Unreviewed Safety Questions*, requires that proposed changes be evaluated to ensure that they do not violate any established safety basis. To meet this requirement, the Pantex USQ process has provisions that require the evaluator to answer a set of standard questions about potential accidents previously analyzed in the authorization basis. However, in practice, Pantex personnel often interpret other portions of the USQ process in order to allow the evaluator to skip these core questions. Consequently, evaluators currently focus primarily on whether the change affects an established control (i.e., an ABCD) rather than the full scope of the potential impacts on the safety basis.
- **The Pantex Plant practice has incorrectly interpreted a DOE memorandum allowing reporting and approval of USQs that require TSR changes as part of the DOE occurrence reporting system.** With the incorrect interpretation, Pantex Plant USQ practices do not always require a formal USQD evaluation when TSR changes are made in response to a potential safety inadequacy. Thus, new information that requires TSR changes are not always documented as positive USQDs and are not specifically added to formal authorization basis documentation. As a result of this procedural weakness, there have been recent incidents where the Pantex Plant has

not adequately documented safety-significant lessons learned. For example, a TSR was modified to require additional controls on combustibles when tests demonstrated that floor mats used in cells were more combustible than originally assumed; however, formal USQD documentation was not completed, and thus the specific lessons learned from the discovery were not captured in facility authorization basis documents. In another example, Pantex Plant personnel determined that shower drains outside the cells in Buildings 12-85 and 12-96 would be leak paths during HED/D accidents that had not been considered in the authorization basis. To address this issue, they bolted cover plates over the drains. Although these shower drain cover plates perform a safety-class function, no changes were made in the BIO, TSR, or TSR analytic basis document to reflect the function of the plates; the approval was documented in an SER but is not part of the official authorization basis list. By contrast, earlier discoveries of cell leak path issues involving doors and door interlock systems were fully documented as USQDs, and the TSR and BIO identify safety features and controls specific to the doors and interlock system.

**ISSUE: The current authorization basis documents and USQ process do not support change controls in accordance with DOE Order 5480.21. Although upgrades are being made to the unreviewed safety question program and authorization basis process and documents, the following areas are not fully addressed by the current programs or planned upgrades: (1) as implemented, the USQ process does not always ensure that changes are reviewed for their potential impact on the safety basis; and (2) the hazard analysis reports do not reference some of the supporting analytical documents, and thus supporting information is not in the authorization basis or controlled.**

In addition to these items, continued and sustained management attention is needed to ensure that the revised processes function as intended and are effective. As one element of the upgrade plan, MHC plans to train as many as 300 personnel to perform USQ prescreens. This represents a substantial expansion in the number of personnel authorized to perform prescreens. Continued attention and effective

feedback mechanisms are needed to ensure that the expanded pool of personnel perform at a consistent level of effectiveness as the expanded program is implemented. Because Pantex does not yet have a fully developed, comprehensive SAR, it is particularly important that all personnel who perform USQ duties be knowledgeable of the process and have a thorough understanding of the large and diverse set of facility and weapons documents that constitute the current authorization basis. In view of the new processes, the lack of a comprehensive SAR, and the expanded pool of USQ screeners, Pantex Plant line management needs to closely monitor future performance to ensure that the processes are effectively implemented and achieve their objectives.


**Summary.** AAO and MHC have evaluated the current weaknesses in hazards assessments and controls and developed appropriate plans for improvement. In the past year, AAO and MHC have focused their attention on certain priority areas, such as HARs for selected weapons systems and the lightning BIO. The resulting hazards assessments in these areas have generally been of high quality and identify appropriate controls. However, considerable work remains to complete the ongoing and planned upgrades to SARs, BIOs, and HARs, as well as priority interim efforts, such as the sitewide BIOs for transportation and fire protection.

Although many areas are adequate, additional improvements are needed in certain aspects of hazards assessments and controls. Needed improvements include enhancing the change control process, ensuring that the formal authorization basis includes all relevant documents (e.g., the analytical basis for the TSRs), documenting the technical analysis of authorization basis assumptions and conclusions more rigorously, and improving the linkage and interfaces among the various documents and analyses that form the activity-level, facility-level, and site-level hazards assessments and technical bases for controls.

**Guiding Principle #7 – Operations Authorization:** Line management must ensure that operations are approved and authorized using established mechanisms for developing and maintaining authorization basis documentation that clearly delineates the terms and conditions for authorizing site, facility, or activity operations. DOE has the ultimate responsibility for ensuring that all operations at DOE facilities are reviewed and authorized at a level commensurate with the hazards and that work authorization processes are established by the contractor. DOE and


the contractor must confirm readiness to implement safety controls before starting work.

As discussed throughout this report, Pantex does not yet have a comprehensive set of authorization basis documents that have been updated to meet the current requirements. However, Pantex has a set of top-tier authorization basis documents, such as SARs, BIOs, and justification for continued operations. These are approved by DOE and document the formal authorization to operate nuclear facilities and weapons activities. These top-tier authorization basis documents adequately encompass the hazardous facilities and operations at the Pantex Plant.



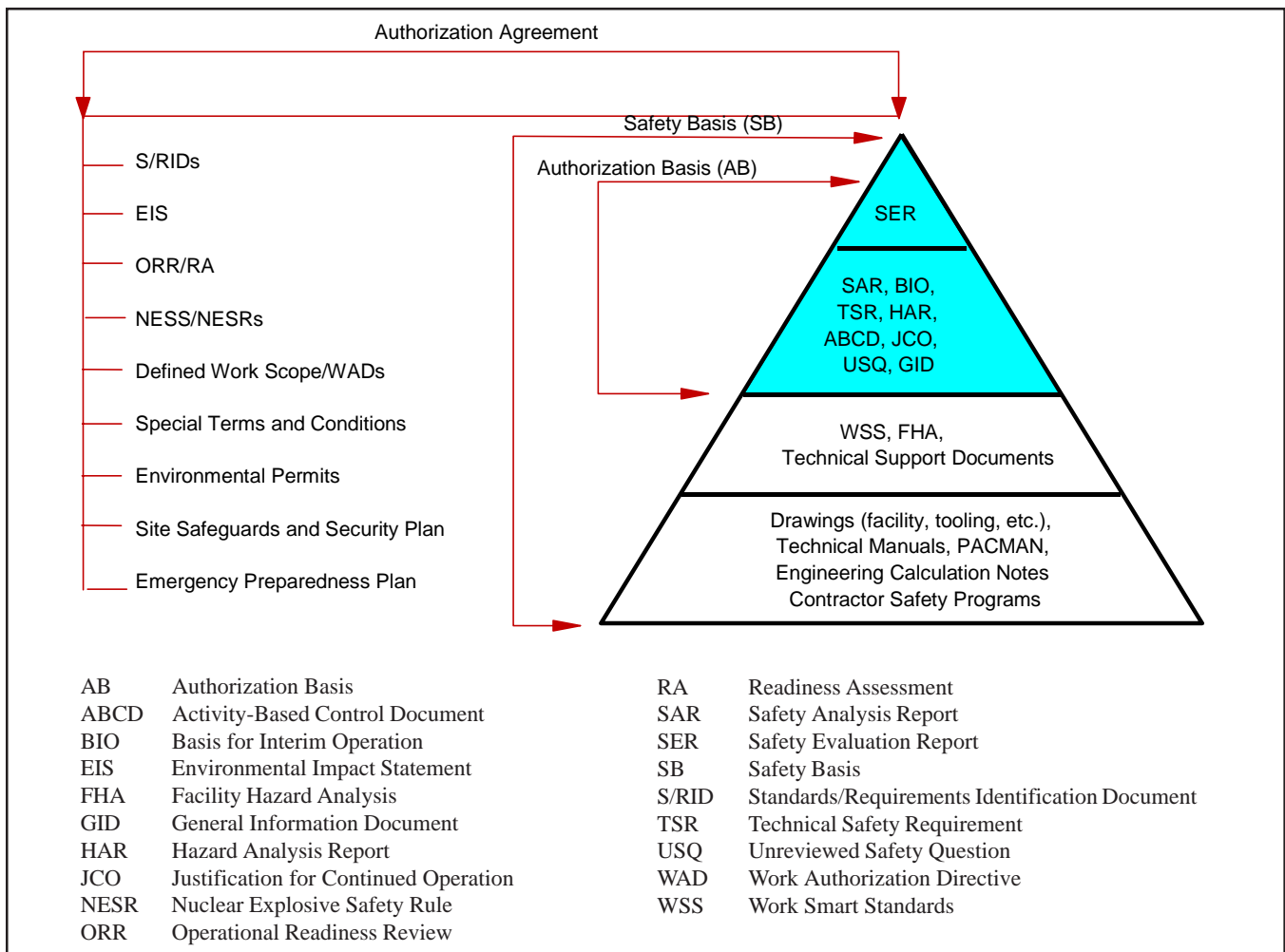
**Pantex authorization agreements are effective in organizing the documents relevant to operations authorization.**

AAO and MHC have established authorization agreements as the mechanism for DOE to authorize operations of weapons activities. As illustrated by Figure 3, the authorization agreement integrates sitewide programs with the authorization basis and supporting documents. Authorization agreements provide an effective method for organizing the multitude of documents relevant to operations authorization.



**Pantex has implemented an improved system for maintaining and controlling authorization basis documents.**

In March 2000, MHC implemented an improved management system for maintaining and controlling authorization basis documents sitewide. This improved system, called the Master Authorization Agreement, applies to Pantex Category 2 nuclear operations. The Master Authorization Agreement is a contractually binding agreement that encompasses the individual authorization agreements for each weapons operation. Under the Master Authorization Agreement, program and facility managers have ownership of the individual weapons operations authorization agreements and are responsible for maintaining them to reflect any changes in the authorization basis. MHC



**Figure 3. Pantex Plant Authorization Agreement Structure**

developed the Master Authorization Agreement consistent with DNFSB/TECH-19, “Authorization Agreements for Defense Nuclear Facilities and Activities,” and DOE Guide 450.4-1A, *Integrated Safety Management System Guide*. MHC has appropriately established formal change control processes, revised the applicable Pantex Plant standard to reflect the new process, provided training to essential personnel on their roles and responsibilities, and conducted a management self-assessment before implementing the program.

Although a significant improvement, the Master Authorization Agreement system is still new, and not all applicable DOE and MHC managers and staff members have received training to ensure that they understand the Master Authorization Agreement. However, more than 80 percent of the identified DOE and MHC managers and staff members have been trained since February 2000, and MHC has added the Master Authorization Agreement as part of their sitewide authorization basis training curriculum.



**A number of methods are used to verify readiness to operate.**

In addition to the Master Authorization Agreement and individual authorization agreements that document the basis for authority to operate, DOE is required to verify that adequate controls are in place and implemented effectively. This verification process includes DOE reviews of the authorization basis documents before they are approved. It also includes readiness reviews, which are the primary method of verifying that controls are adequately implemented before work is performed, before startup or restart of an operation is authorized. Key elements of the verification process as implemented at the Pantex Plant are:

- **DOE review of facility and site authorization basis documents.** AAO conducts site/facility safety reviews following an upgraded Area Office

Procedure 106.1, *Authorization Basis Documentation Program*, which implements the guidance of DOE-STD-1104-96, *Review and Approval of Nonreactor Nuclear Facility Safety Analysis Reports*.

- **DOE review of HARs for nuclear explosive operations.** In accordance with a November 1999 procedure, AL implemented the SBRT to review HARs and ABCDs. With the March 2000 transition of responsibilities for HAR approval to AAO, AAO expects to take over the HAR review process by the end of this year and to revise the applicable procedure (Procedure 106.1) to include the use of the SBRT process.
- **Contractor (MHC) readiness review.** Before declaring readiness to operate, MHC performs a readiness review based on DOE Order 425.1A and encompasses both weapons and facility authorization basis implementation. Prior to the formal review, operations personnel conduct a self-assessment (referred to at Pantex as a technical assist).
- **DOE Readiness Reviews.** After DOE receives MHC's declaration of readiness and the MHC readiness review final report, a DOE readiness review is conducted in accordance with DOE Order 425.1A, *Startup and Restart of Nuclear Facilities*, AL supplemental directives, and DOE-STD-3006-95, *Planning and Conduct of Operational Readiness Reviews*. Depending on the scope, the readiness review is conducted by AAO or the Independent Safety Review Division of AL.



Pantex Plant and surrounding area

- **DOE NESS.** The NESS is conducted by an NESSG to provide additional safety insights and recommendations for the authorizing official to approve the nuclear explosive operation. The NESS evaluates the adequacy of controls to minimize the possibility of an inadvertent or deliberate unauthorized nuclear detonation, high-explosive detonation or deflagration, fire, or fissile material dispersal.

In the past, there have been significant weaknesses in several of these programs. The DOE reviews of authorization basis documents have been overlapping and resulted in conflicting comments, in part because of a lack of adequate guidance as to expectations and insufficient technical expertise on the part of the reviewers. The DNFSB determined that both the contractor and DOE readiness process were deficient. One DNFSB issue was that line managers (DOE and contractor) were using readiness reviews to assist in attaining readiness (e.g., helping to correct problems), rather than as an independent confirmation of readiness. The ABTF also identified problems in these verification reviews. In addition, Pantex line management recognizes that technical assists have not been conducted with the rigor and expertise needed to identify deficiencies prior to the formal contractor and DOE readiness reviews.

**Pantex verification processes have been enhanced.**

Many aspects of the verification process have been improved in the past year in response to external and internal assessment findings. Some improvements resulted from a December 1999 AL self-assessment of AL and contractor readiness review activities at AL sites, which was, in part, a response to the August 26, 1999, DNFSB letter regarding issues in the startup and restart process for DOE nuclear facilities. Some recent improvements include:

- As a result of the AL self-assessment, AL and AAO revised AL Directive 425.1 and AAO Procedure 115.1.0 to clarify the startup/restart process.
- MHC has provided additional training on assessment techniques and enhanced its procedures to ensure that managers and staff conduct better readiness reviews based on the DNFSB letter and subsequent AL self-assessment.

- In June 1999, AL added a chapter to the D&P Manual that delineates the independent reviews required for nuclear explosive operations.
- The MHC readiness review process has made improvements (e.g., enhanced procedures for confirmation of readiness) based on findings from the ABTF report of May 1999, DNFSB concerns, and an AL audit conducted in November 1999.

In addition, AL and AAO have been proactive in planning for the transition of responsibilities for review of HARs, including plans to add AAO staff to handle the increased workload and establishment of a memorandum of understanding for the transition period. Other improvements are being considered, such as the conduct of concurrent DOE readiness reviews and NESSs. The readiness review team determined that the interfaces with the NESSG were beneficial, especially on common review activities (e.g., configuration management). AL is considering institutionalizing the practice of concurrent DOE readiness review and NESS reviews.



**Continued attention is needed to ensure that enhanced programs are fully effective.**

Although the recent enhancements are promising, they have not been in place for very long. Continued attention is needed to ensure they are fully and effectively implemented. However, the improved processes have already had a positive impact. For example, recent efforts by AL/AAO, such as the SER for the lightning BIO and W-78 Safety Basis Review Plan, had well-defined plans/scopes and used qualified personnel.

A few areas warrant additional attention:

- The SBRT interface with the contractor does not provide for timely feedback. For example, the SBRT generally reviews interim documents but does not provide comments until the final stages, so significant changes in direction can occur at a late stage. While it is important to ensure that the reviewers do not provide direction through premature comments, it is possible to establish a system for reviewing interim products at designated points in the process to ensure that all

parties agree with the approach before moving to the next phase.

- The technical adequacy and completeness of the SER depend primarily on the experience and expertise of the SBRT leader, who has responsibility for most aspects of the AL/AAO review of authorization basis documents. AAO does not have a clear set of criteria and performance expectations for conducting safety basis reviews or a standard review plan that addresses the approach, team makeup, level of effort, technical review areas, and SER preparation for future SBRTs.
- Several of the documents governing verification reviews are outdated, reference cancelled orders, or do not reflect the recent realignment of responsibilities. For example, MHC STD-7302, *Operational Readiness Review*, is outdated, contains several references to cancelled DOE Order 5480.31, and does not reflect the current MHC organization's roles and responsibilities.

**Summary.** The Pantex Plant has a well-defined set of documents that provide the authority to operate facilities and perform nuclear explosive operations. The establishment of the Master Authorization Agreement has helped to ensure that authorization basis documents are effectively maintained. AL, AAO, and MHC are working to improve processes, such as authorization basis document reviews and readiness reviews, to ensure that the verification reviews provide enough information to the approval authority to make informed decisions about operational readiness. Many processes related to operations authorization have been implemented or enhanced in the past year, including the Master Authorization Agreements, authorization basis reviews, and readiness reviews. While these enhancements are a significant accomplishment, they are relatively new and require continued attention to ensure full and effective implementation. Further improvements are needed in certain areas, such as processes to ensure that the SER reviews are conducted according to consistently effective protocols. Also, as discussed throughout this report, the timely completion of the upgraded authorization basis documents and other enhancements to the hazard analysis and ISM program are important in ensuring that AAO has a comprehensive set of rigorous analyses to support informed decisions.



**Core Function #5 – Performance Feedback and Continuous Improvement:** The concept of continuous improvement requires that line management establish formalized mechanisms and processes for identifying and documenting environment, safety and health-related (ES&H) deficiencies and for tracking corrective actions. To ensure that corrective actions are timely, complete, and effective, a firm technical basis and the responsibility for timely implementation must be clearly identified. To avoid event recurrence, line management must establish a process for disseminating lessons learned to affected personnel, both internally and across the DOE complex.

Weaknesses related to performance feedback and continuous improvement programs were identified in the 1996 Office of Oversight safety management evaluation of the Pantex Plant. That report identified several problems, including weak and informal self-assessments, insufficient rigor in tracking and trending of identified deficiencies, and a lack of comprehensiveness in assessment programs. Collectively, these weaknesses resulted in senior management not getting an integrated and comprehensive perspective on the adequacy of ES&H programs and a limited ability to identify the extent and scope of problems and allocate resources accordingly.



**Line management is working to systematically take corrective actions.**

Although some of these problems are still evident, recent evidence indicates that line management is working to systematically identify deficiencies, assess the deficiencies and their causes, and take corrective actions that are based on a strategic assessment of the underlying problems. A notable example of recent MHC management attention to performance feedback is the recent MHC self-assessment of Pantex Plant authorization basis activities. This effort was chartered by the MHC General Manager in February 1999 and conducted by the ABTF. The self-assessment was afforded management support and a broad scope with the goal of improving authorization basis policies, performance criteria, tools, methodologies, training, culture, and management leadership. The ABTF identified a number of global authorization basis issues, such as the need to complete the culture change from expert-based to standards-based processes and operations, lack of an integrated authorization basis issues and commitments tracking system, and lack of

clear policy and formally agreed-upon methods for executing authorization basis activities. A corrective action plan for the ABTF issues was developed in June 1999. Corrective actions were established and tracked on a plant-wide issue tracking system, and most of the corrective actions have been completed. Some of the significant completed actions that resulted from this effort include the development of the Master Authorization Agreement, development of authorization basis standards and manual, and strengthening authorization basis leadership (i.e., appointing an experienced Authorization Basis Program Director with extensive commercial and DOE authorization basis experience). Other actions resulting from this assessment, such as strengthening the USQ process, are ongoing and being tracked.

The revision to the DOE implementation plan for DNFSB Recommendation 98-2 is a notable example of increased AL and AAO attention to corrective actions, lessons learned, and continuous improvement. Although not finalized or approved, the revised implementation plan reflects a strategic approach to addressing a variety of related weaknesses using an ISM approach. For example, the revised plan includes a commitment to develop a strategic plan that addresses interfaces among the various SARs and HARs – a problem identified by several internal and external reviews.



**MHC is improving the lessons-learned program.**

In coordination with AAO, MHC has worked to improve its lessons-learned program and has had success in some areas. The MHC lessons-learned program uses a sitewide tracking system for collecting and disseminating lessons learned, both within and outside the Pantex Plant. A program manager and approximately 15 lessons-learned coordinators located throughout the plant manage the program according to an MHC plant standard. Although the framework for the program has been in place, the MHC lessons-learned program has not matured enough to significantly benefit recent weapons program activities, such as the W-62, W-87, and W-69 programs. These programs were conducted concurrently, and the individual programs did not include formal provisions for systematically sharing and acting on lessons learned in other programs. Further, the lessons learned from individual programs have been maintained according

to informal procedures and are not in an easily shared format. However, recent AL/AAO and MHC efforts have focused on applying lessons learned to weapons authorization basis activities. For example, lessons-learned workshops have been held on several weapons systems with broad participation from MHC, AAO, AL, DP, LANL, LLNL, and SNL. These workshops are now routinely conducted prior to HAR development. This recent emphasis has had positive impacts:

- A more recent weapons program, the W-88 existing operations reauthorization project, has established formal provisions for systematically reviewing and incorporating lessons learned from other weapons systems into HAR/ABCD development.
- The Integrated Safety Process Implementation Plan for the W-78 incorporated a full week for reviewing and incorporating lessons learned into the HAR process from the W-56, W-87, W-76, W-62, W-69, W-79, and W-88. Also, the W-78 HAR submission was delayed so that lessons learned from W-88 and W-76 could be properly implemented.
- The lessons learned from recent programs were collectively analyzed and used as an important input to the Authorization Basis Manual so that future programs would benefit from a range of lessons learned.

Although efforts to apply lessons learned have had some success in weapons programs and HARs, the Pantex Plant is not as far along in applying the lessons learned process to site and facility authorization bases, such as BIOs and SARs. Pantex line management has taken some actions to improve in this area, such as the appointment of a coordinator to help structure the lessons-learned process for all authorization basis teams, including weapon, facility/site, authorization basis/USQ support, and special projects. However, increased management attention is needed to ensure that lessons learned are effectively applied across the site. Specific areas that need attention include incorporating appropriate requirements and guidance in the D&P Manual, providing adequate guidance in the MHC Authorization Basis Manual for integrating lessons learned into the hazard analysis process for both weapons and facility authorization basis activities,

better formalizing the lessons-learned program across weapons and facility authorization basis activities, and ensuring that the lessons-learned coordinator has effective processes for sharing lessons learned across the site.



**Additional solicitation of feedback from workers is needed.**

Another area where additional management attention is needed is solicitation of feedback from workers; some specific groups of workers may provide particularly valuable feedback in the short term. The first is the production technicians and first-line supervisors, including those on project teams who implement many of the controls that result from safety basis analyses and resulting ABCDs and TSRs. While they are applying the more extensive controls with appropriate rigor, some of these workers have expressed frustration at how long they take and do not appreciate their value (as sometimes occurs when controls are designed to prevent low-probability, high-consequence events, such as lightning strikes, that could cause an undesired event with a nuclear weapon). Feedback from workers may identify better and faster ways to accomplish the same objectives with the same degree of safety. Efforts to solicit feedback may also serve to increase workers' "buy in" when time-consuming operational checks are necessary and suitable alternatives cannot be identified. A second group of workers that may provide valuable feedback is the managers and analysts who are involved in the USQ process. The USQ efforts have undergone many changes, and it is important to determine whether the personnel understand the processes, whether they are working as intended, and whether they can be improved.



**Sustained attention to the overall feedback and improvement program is needed.**

While improvements have been made, sustained attention is needed to ensure that the overall feedback and improvement program provides comprehensive and timely information to management. Recent efforts, such as the ABTF, have been effective and resulted in many corrective actions. In addition, many corrective actions have been implemented in response to a variety

of external assessments (DNFSB, ISM verification, Office of Oversight). Sustained management attention is needed to ensure that efforts such as the ABTF are conducted routinely and that the feedback programs are institutionalized, rigorous, and comprehensive.

Before the current Office of Oversight evaluation, a DP staff member disseminated a technical paper highlighting concerns with the Pantex Plant authorization basis processes and documents. The Office of Oversight did not specifically investigate those concerns. However, the AL Manager ordered an independent investigation of those concerns by an individual from outside of the Pantex Plant line management chain. The observations of the Oversight team were consistent with the results of that independent assessment.

**Summary.** AL, AAO, and MHC have made progress in improving some aspects of performance feedback and continuous improvement programs. Line management is working to systematically identify deficiencies, assess the deficiencies and their causes,

and take corrective actions that are based on a strategic assessment of the underlying problems, as evidenced by the recent MHC self-assessment that was successful in identifying and correcting a number of important deficiencies. The revision of the DOE implementation plan for DNFSB Recommendation 98-2 is also an example of increased AL and AAO attention to corrective actions, lessons learned, and continuous improvement. AL, AAO, and MHC have taken corrective actions in response to weaknesses identified by many internal and external reviews. The corrective actions completed over the past year are significant, and others are ongoing, including recent improvements in applying lessons learned to HARs. However, the Pantex Plant has not had similar success in applying lessons learned to site and facility authorization basis documents, such as BIOs and SARs, and additional management attention is needed to solicit feedback from workers, especially production technicians and others who implement the controls.

Significant improvements in authorization basis activities have been made at the Pantex Plant, particularly in the past year. However, additional work is needed to address the 1996 Office of Oversight issue related to authorization basis. Pantex Plant line management (DP, AL, AAO, and MHC) have assessed the past weaknesses, identified the need for further improvement, and initiated many actions. The current efforts, such as those in the revised implementation plan for DNFSB Recommendation 98-2 and actions taken in response to the ABTF findings, are appropriate measures to address weaknesses in the authorization basis processes and products. However, some of the ongoing and planned initiatives are at an early stage of development or implementation, and their effectiveness has yet to be demonstrated. Continued management attention is needed to ensure that recent, ongoing, and planned initiatives are fully and effectively implemented and that they are verified to achieve their objectives.

In addition to the initiatives planned by Pantex Plant line management, the Office of Oversight identified several additional opportunities for improvement. The purpose of these opportunities for improvement is to provide line management with feedback that may help to address identified weaknesses. The opportunities for improvement are intended to assist line management in identifying options, potential solutions, and potential enhancements to their programs. The responsible DOE and contractor line management should review and evaluate the opportunities for improvement enumerated below, as well as the specific suggested actions listed under each item. However, the opportunities for improvement and suggested actions are not intended to limit the initiatives and good judgment of line managers. Line management is ultimately responsible for safety and should use their experience and judgment in developing corrective actions, in accordance with site-specific programmatic and ES&H objectives.

### **1. Increase management attention to implementation of safety basis responsibilities and build the trust and confidence of the workforce through proactive efforts by AAO and MHC managers.**

- Become more active and visible advocates of safety basis activities by capitalizing on the strong management/union working relationship and through participation on longstanding Pantex safety committees by both AAO and MHC senior managers.
- Improve the understanding, acceptance, and sustained implementation of safety basis controls through stronger MHC management and supervisory leadership and accountability.
- Improve worker (supervisory and production technician) ownership of safety basis responsibilities by providing additional training, soliciting feedback from workers, providing feedback to workers, and increasing MHC senior management's field presence.
- Increase the presence of AAO production operations team members and Facility Representatives on the floor, with particular emphasis on verifying supervisory and production technician understanding of safety basis responsibilities.
- Consider initiating rotational assignments, in which first-line supervisors work in the Plant Standards Department for a defined period as part of the training and qualification program, with the objective of increasing supervisors' knowledge and understanding of the safety basis procedural processes and basis for controls.

**2. Strengthen the processes and mechanisms by which DOE holds the national laboratories accountable for commitments in support of authorization basis development and implementation activities at Pantex, and by which the national laboratories support MHC authorization basis-related activities.**

- Implement AL mechanisms, including the use of contract performance incentives in the LANL and SNL contracts, for holding the laboratories accountable for supporting authorization basis commitments at Pantex.
- Under DP auspices, ensure that the Oakland Operations Office pursues mechanisms in parallel with AL, including contract performance incentives, for holding LLNL accountable for supporting authorization basis commitments at Pantex.
- Strengthen the authority of the Tri-Lab group representation to direct laboratory resources in support of Pantex authorization basis activities.
- Continue to define and expand those areas of the D&P Manual that describe how the national laboratories support the IWAP, weapons safety specifications, and related authorization basis development and implementation activities at Pantex.

**3. Ensure that the integrated SAR implementation plan is developed and tracked as a mechanism for clearly defining methods for completing the integrated site SAR.**

- Clearly define the scope and endpoints for each portion of the plan in sufficient detail to meet AAO expectations.
- Perform gap analysis on all elements of the plan to ensure that critical components and activities are not missed.
- Establish key milestones within the plan to be used as the basis for AAO project reviews.
- Incorporate frequent AAO project reviews into the plan to track progress and provide timely input to

the Pantex contractor about needed corrective actions.

**4. Sustain priority and attention on establishing a framework that defines authorization bases that provide an adequate technical basis for DOE to authorize operation of Pantex nuclear and nuclear explosives facilities.**

- Ensure that safety basis documents contain sufficient information, including the establishment of clear linkages on references to other completed analyses and supporting documents, to serve as the basis for the hazard analysis and selection of hazard controls for authorization of operations.
- Continue to place high priority on identifying and implementing engineered solutions for identified high hazards, such as use of non-flammable solvents to reduce fire risks and development of the “war wagon” (a cart that is specially designed to protect weapons and weapons components during movements) to address transportation concerns for weapons systems operations.
- Formalize and update processes (e.g., memorandum of agreement) to improve coordination with external organizations, such as the National Weather Service and the Amarillo Airport, that are relied upon to support the implementation of safety basis controls (e.g., weather information for lightning BIO).
- As part of the USQ upgrade program decentralization efforts, assign safety basis analysts as mentors to coach line personnel performing USQD to ensure that the depth and technical basis of the analysis are adequate and that newly qualified personnel have a sufficient understanding of the facility and activity authorization basis and use current and approved safety basis document lists.

**5. Ensure that DP Headquarters technical support roles and responsibilities are properly aligned and that management systems are in place to effectively allocate DP Headquarters resources to support field element approval authorities.**

- Re-evaluate DP Headquarters organizations that are primarily assigned technical support functions

to ensure that their mission and reporting relationships are appropriately aligned to support field elements and are “customer-driven.”

- Establish systematic processes to effectively prioritize the resources and activities of DP technical specialists to support the field elements in quantifying the risk of proposed operations so that responsible DOE line managers have the necessary information to make informed safety decisions.
- Establish organizational accountability mechanisms and performance metrics that are “customer-based” to strengthen and institutionalize Headquarters and field element organizational relationships.

**6. Strengthen the AAO and MHC management systems and processes for management and independent review and identification and dissemination of lessons learned.**

- Formalize and institutionalize the lessons-learned process for safety basis activities by: (1) updating D&P Manual Chapter 11.4 to address and set expectations for lessons-learned actions for safety basis activities, (2) revising the MHC Authorization Basis Manual to provide guidance on how lessons learned are to be integrated into the hazards analysis process for both facility and weapons/activity authorization basis activities, and (3) establishing mechanisms for sharing and incorporating lessons learned across weapons and facility authorization basis project teams, and between MHC and design agencies in support of weapons project activities.
- Increase emphasis on developing performance measures, such as the number of procedural change requests, and soliciting feedback from operations managers and production technicians to identify performance improvements for procedures, tooling, and training, particularly within the first few months following startup of a weapons project and/or implementation of new sitewide controls.
- Strengthen the integration of SBRT activities with MHC HAR and facility safety analysis development teams by ensuring that: (1) the SBRT review plan is sufficiently detailed to clearly identify

the scope, review criteria, in-process reviews, and schedule, and that it is coordinated with the appropriate MHC project leader prior to approval by the AAO Manager; (2) deviations from the scope and review criteria used by the SBRT are clearly communicated to and coordinated with the MHC project leader; (3) the SBRT team leader is held accountable for conducting and documenting in-process reviews to ensure timely feedback to the MHC project leader on systemic issues and deficiencies in the analysis or methodology used; and (4) the SBRT establishes interim review milestones so that timely input is received and used to more effectively meet HAR endpoint expectations.

- Strengthen MHC management technical assist reviews, conducted prior to contractor readiness reviews, by ensuring that an appropriate level of expertise and rigor is applied to identify and address deficiencies before any subsequent independent reviews are conducted.

**7. Continue management actions to increase AAO and MHC technical and project management capability, with the objective of facilitating the inclusion of safety as an integral part of Pantex Plant operations.**

- Formalize goals and expectations for qualifying all AAO authorization basis staff, and include them in individual annual performance plans. Expedite current AAO plans for hiring additional authorization basis staff.
- Provide formal authorization basis training (e.g., accident analysis) as appropriate to AAO staff involved in leading or supporting safety evaluation reviews. Link training needs to the AAO safety analyst qualification standard. Revise AAO Procedure 106.1, Authorization Basis Documentation Program, to link SER/SBRT team leader qualifications to the safety analyst qualification standard.
- On a priority basis, develop an MHC long-term staffing plan that is based on a staffing analysis, and set specific goals for hiring and retention of authorization basis personnel, including technical manager positions. The plan should address

succession planning for technical/advisor and managerial authorization basis positions.

- Complete an authorization basis qualification standard for MHC personnel that includes education, experience, and training requirements.
- Accelerate implementation of the MHC management approach for managing the IWAP and related activities. Complete the Project Support Office project plan that describes the necessary elements for establishing the MHC project management system, including defining DOE and MHC customer expectations, establishing training and qualification requirements for project managers, identifying and implementing necessary standards, upgrading project management software, and completing a project management manual describing how Pantex projects are established and managed.
- Broaden the scope and specificity of IWAP activities that are managed under project management methodology to include enduring stockpile activities, infrastructure upgrades, and other critical activities to provide management with an overall integrated tool for managing schedules, resources, facilities, and priorities.

**8. Strengthen the current authorization basis for the interim while longer-term actions are under way.**

- Ensure that the TSR analytic basis document is considered during USQs and that the results are fully integrated into the authorization basis and Master Authorization Agreement.
- Incorporate BIO controls for transportation and the Dynamic Balancer Facility into the TSR.
- Provide adequate justification for eliminating controls such as the radiation monitoring and alarm system during the conversion from the Critical Safety System Manual to TSRs.
- Provide an adequate basis for new or modified TSR limits, such as those for radionuclides and high explosives.
- Revise the Facility 12-116 SAR during the next update to include seismic resistance of pit storage and the consequences of collapse of the pallets holding the pits in drums.
- Consider inclusion of the fire department intervention in the fire protection BIO, as appropriate.
- Develop a sound technical basis for cell leakage pathways with clearly defined controls.
- Ensure that the authorization basis list used for the USQ process includes all appropriate documents, such as SERs, required by DOE Order 5480.21. Also add the GID to the sub-list for facilities.

## APPENDIX A

### ISSUES FOR CORRECTIVE ACTION AND FOLLOW-UP

As part of the implementation plan for DNFSB Recommendation 98-1, which dealt with corrective actions in response to independent oversight findings, a set of previously identified issues was compiled and issued. The DOE lead program secretarial office, DP, was required to develop a corrective action plan to address these legacy issues, which will be evaluated, corrected, closed, and verified. The corrective action process has since been institutionalized and is delineated in DOE Order 414.1A, *Quality Assurance*.

During this follow-up evaluation, the Office of Oversight determined that the legacy issue is still open, but that the efforts to address the legacy issue (including the actions defined under the revised implementation plan for DNFSB 98-2, which applies to the Pantex authorization basis process) are appropriate. However, the actions planned by the Pantex Plant as part of the revised implementation plan for DNFSB 98-2 need to be crosswalked to the 1996 legacy issue and entered into the DOE Corrective Action Tracking System (CATS). The revised implementation plan identifies the needed long-term actions to address the 1996 legacy issues.

In addition, one new issue that requires interim, shorter-term measures to address was identified. In accordance with DOE Order 414.1A, these issues require submittal of an approved corrective action plan and entry into CATS to ensure tracking and verification of completion.

The fire protection system deficiencies are not identified as a new issue because they are covered under the current commitment to DNFSB in the revised implementation plan for DNFSB 98-2. However, the Office of Oversight will monitor progress on the fire system upgrades Sby monitoring the Pantex Plant's progress on actions specified in the revised implementation plan for DNFSB Recommendation 98-2.

The legacy issue is included below, along with Oversight insights from this follow-up evaluation. It is noted that CATS has an administrative error that incorrectly reflects the legacy issue as completed; however, the more recent attached crosswalk correctly shows the issue as open. The new issues that require formal tracking and follow-up are also identified in tabular form.

IDENTIFIER	LEGACY ISSUE
PP-10/01/1996-0002-I	<p>Lack of Fully Developed Authorization Basis Documents – the MHC lacks fully developed authorization basis documents at Pantex, such as SARs and TSR documents. Progress in updating SARs has been limited by ineffective monitoring by DP and AL of MHC work activities, inconsistent reviews by AAO, AL, and DP staff, and difficulties experienced by MHC in resolving technical issues.</p> <p>This Oversight evaluation determined that DP, AL, AAO, and MHC have made many improvements in authorization basis since 1996. Although much work remains, the remaining problems and efforts are well-understood and the approach to completing remaining actions is well-defined. The need to develop authorization basis documents consistent with current requirements is highlighted by the current lack of fully developed analysis for scenarios such as an explosion without full activation of the filtration system. The Pantex Plant needs to crosswalk actions identified in the revised implementation plant for DNFSB Recommendation 98-2 against this legacy issue and enter those actions into the CATS as appropriate. The Office of Oversight will continue to monitor progress until the ongoing actions, including fire protection system upgrades, are complete and verified to be effective.</p>
IDENTIFIER	ISSUE
PP-2000-#1	<p>The current authorization basis documents and unreviewed safety question process do not support change controls in accordance with DOE Order 5480.21. Although upgrades are being made to the unreviewed safety question program and authorization basis process and documents, the following areas are not fully addressed by the current programs or planned upgrades: (1) as implemented, the unreviewed safety question process does not always ensure that changes are reviewed for their potential impact on the safety basis; and (2) the hazard analysis reports do not reference some of the supporting analytical documents, and thus supporting information is not in the authorization basis or controlled.</p>



## APPENDIX B

# EVALUATION PROCESS AND TEAM COMPOSITION

The evaluation was conducted according to formal protocols and procedures, including an Appraisal Process Guide, which provides the general procedures used by the Office of Oversight program for conducting inspections and reviews, and the draft Authorization Basis Protocol. These documents provide the general framework for the work processes used by the Office of Oversight for conducting evaluations and reviews. Based on these Office of Oversight protocols, an Evaluation Plan was developed for this follow-up evaluation, which outlined the scope and conduct of the evaluation. Each team member developed individual plans and schedules of onsite activities that complemented the overall plan and were tailored to the current status of authorization basis documents, processes, and initiatives.

Planning sessions were conducted to ensure that all team members were informed of the review objectives, procedures, and methods. The planning process considered previously identified weaknesses; current AL, AAO, and Pantex activities; and AL and Pantex management initiatives. The evaluation team collected data through interviews, document reviews, walk-downs, and observation of activities. Interviews were conducted with the National Nuclear Security Agency/DP, AL, AAO, and MHC managers, supervisors, analysts, facility management, and safety personnel.

Primary evaluation focus areas included:

1. Current initiatives associated with authorization basis to including:
  - The expectations, strategies, milestones, and detailed plans and incentives for authorization basis initiatives
  - The priorities and resources applied toward authorization basis initiatives
  - Progress in resolving previously identified deficiencies regarding the authorization basis, including the 1996 Oversight evaluation, the MHC Authorization Basis Task Force Report, and implementation plans for related DNFSB recommendations
2. The authorization basis for weapons programs, including:
  - Compensatory measures in place while initiatives are ongoing.
  - The current process and management systems associated with the development, approval, and maintenance of the authorization basis
  - The W-56, W-62, W-76, and W-87 weapons programs hazard analysis reports, activity based controls documents, and safety evaluation reports
  - Flowdown of controls to the Nuclear Explosive Operations Procedures
  - The process to evaluate changes
  - Integration with facility authorization basis.
3. The authorization basis for facilities, including:
  - The current process and management systems associated with the development, approval, and maintenance of the authorization basis
  - The recently developed lightning BIOs and justification for continued operations
  - The recently developed technical safety requirements
  - The final safety analysis report and safety evaluation report for the Special Nuclear Material Component Staging Facility (Building 11-116)
  - The unreviewed safety question process
  - The integration with weapons program authorization basis.

The Oversight team evaluated the ISM guiding principles and the performance feedback and continuous improvement core function. In addition, a team of technical specialists evaluated the adequacy of selected authorization basis documents in identifying the hazards and the controls in place to protect the workers, public, and environment. Input from the technical specialists was used in evaluating implementation of the guiding principles of safety management at Pantex. Department of Energy Orders 452.1A, *Nuclear Explosive and Weapon Surety Program*, 452.2A, *Safety of Nuclear Explosive Operations*, 5480.21, *Unreviewed Safety Questions*, 5480.22, *Technical Safety Requirements*, and 5480.23, *Nuclear Safety Analysis Reports*, provide the requirements for nuclear explosive and nuclear facility authorization basis. The draft report was reviewed by a quality review board and revised as needed. The facts used to develop the report were validated with Pantex Plant line management, and AAO and MHC representatives reviewed the draft report for factual accuracy.

### **Team Composition**

The team membership, composition, and responsibilities were as follows:

#### **Deputy Assistant Secretary for Oversight**

S. David Stadler, Ph.D.

#### **Associate Deputy Assistant Secretary for Oversight**

Raymond Hardwick

#### **Director, Office of ES&H Evaluations**

Patricia Worthington, Ph.D.  
Tom Staker, Deputy (Acting)

### **Team Leader**

Tom Staker  
Tony Eng, Deputy

### **Management Systems**

Robert Freeman, Management Lead  
Bernard Kokenge  
Jeff Woody  
Tony Eng

### **Technical Specialists**

P.K. Niyogi, Technical Lead  
Frank Chen  
Pranab Guha  
Ed Lee  
Dan Guzy  
Dennis Kubicki  
Mel Chew  
Sam Chu  
Sushil Bhatnagar\*  
Subir Sen\*  
Vishwa Kapila\*  
Frank Reiman\*

\*Headquarters Support

### **Administrative Support**

Sandy Pate  
Tom Davis  
Marcia Taylor  
Michelle Stover

### **Quality Review Board**

Raymond Hardwick  
Frank Russo  
Patricia Worthington  
Sarbes Acharya

## Abbreviations Used in This Report

<b>AAO</b>	<b>Amarillo Area Office</b>
<b>ABCD</b>	<b>Activity-Based Control Document</b>
<b>ABTF</b>	<b>Authorization Basis Task Force</b>
<b>AL</b>	<b>Albuquerque Operations Office</b>
<b>BIO</b>	<b>Basis for Interim Operation</b>
<b>DNFSB</b>	<b>Defense Nuclear Facilities Safety Board</b>
<b>DOE</b>	<b>U.S. Department of Energy</b>
<b>DP</b>	<b>Office of Defense Programs</b>
<b>D&amp;P</b>	<b>Development and Production</b>
<b>ES&amp;H</b>	<b>Environment, Safety, and Health</b>
<b>FSAR</b>	<b>Final Safety Analysis Report</b>
<b>GID</b>	<b>General Information Document</b>
<b>HAR</b>	<b>Hazard Analysis Report</b>
<b>HED/D</b>	<b>High Explosive Detonation/Deflagration</b>
<b>ISM</b>	<b>Integrated Safety Management</b>
<b>IWAP</b>	<b>Integrated Weapons Activity Plan</b>
<b>LANL</b>	<b>Los Alamos National Laboratory</b>
<b>LLNL</b>	<b>Lawrence Livermore National Laboratory</b>
<b>MHC</b>	<b>Mason and Hanger Corporation</b>
<b>MIC</b>	<b>Management, Integration and Controls</b>
<b>NEOP</b>	<b>Nuclear Explosive Operating Procedure</b>
<b>NESS</b>	<b>Nuclear Explosive Safety Study</b>
<b>NESSG</b>	<b>Nuclear Explosive Safety Study Group</b>
<b>SAR</b>	<b>Safety Analysis Report</b>
<b>SBRT</b>	<b>Safety Basis Review Team</b>
<b>SER</b>	<b>Safety Evaluation Report</b>
<b>SMT</b>	<b>Standing Management Team</b>
<b>SNL</b>	<b>Sandia National Laboratories</b>
<b>S/RID</b>	<b>Standards/Requirements Identification Document</b>
<b>SS-21</b>	<b>Seamless Safety for the Twenty-First Century</b>
<b>TSR</b>	<b>Technical Safety Requirement</b>
<b>USQ</b>	<b>Unreviewed Safety Question</b>
<b>USQD</b>	<b>Unreviewed Safety Question Determination</b>